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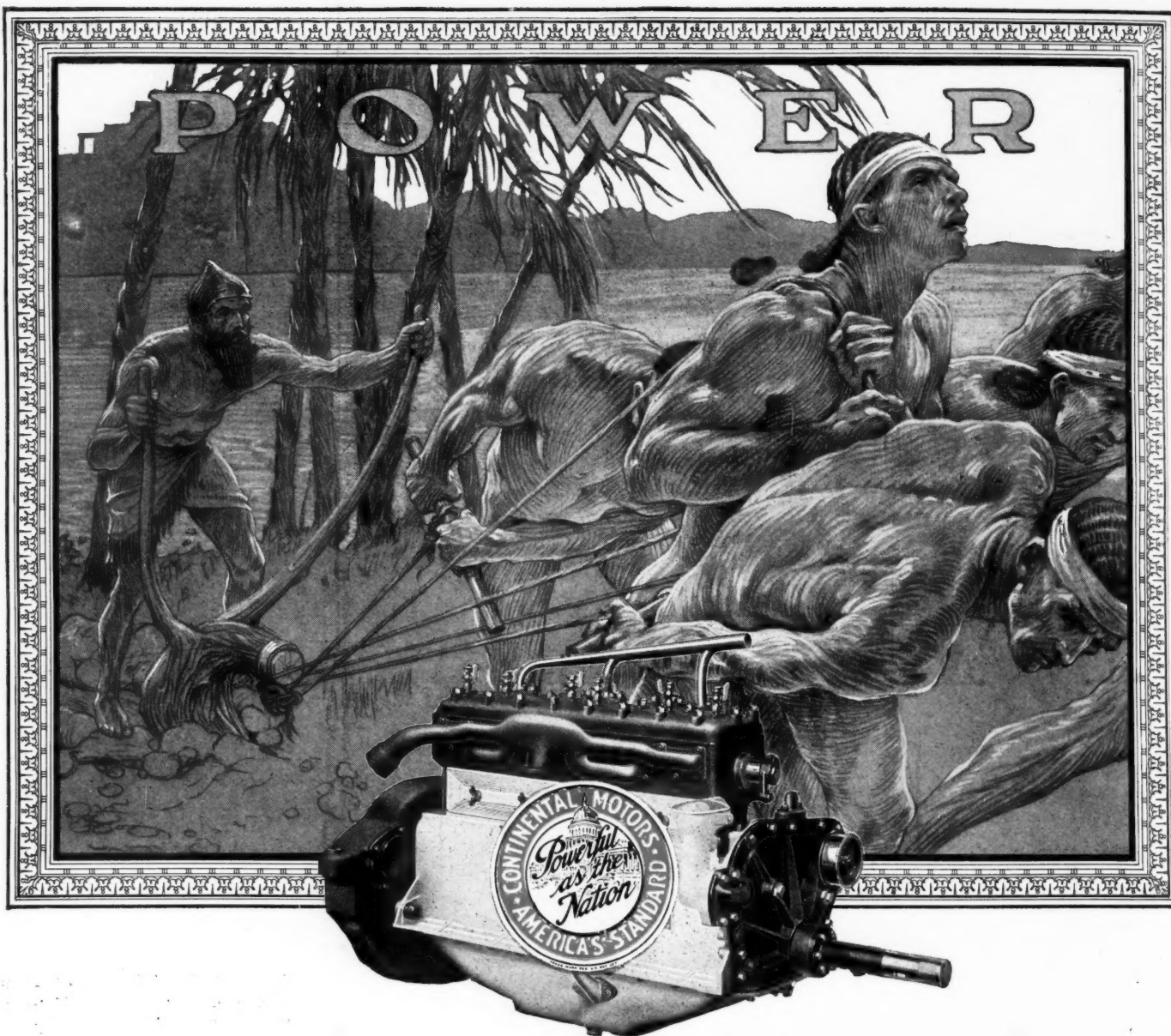
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Frankness Essential Between Manufacturer and Dealer

The recent disturbance in automobile sales might be called a business disease. This article points out some of the causes and symptoms of the malady and indicates the way to cure this unhealthy condition. It is only a passing attack and not due to some constitutional disorder, as many would have us believe

By Clyde Jennings

THE recent credit flurry appears to have brought about a temporary setback in the rate of selling of automobiles, and might be said to have been the cause of a touch of appendicitis in the dual sales system of this great industry. Both the systems, representing the factories and the dealers, are suffering somewhat, while the sales experts are conferring in the guise of medical practitioners.

They have learned, so far, that the attack is more severe in the extreme east and west of the selling territory, while in the Middle West, nearest the factories, the trade continues nearly normal. Also, they have about decided the attack is not one to justify an operation, but that, owing to the age and former vigor of the patient, the best hope is in good nursing and, after the present weakness passes, a severe course of training for the patient, with a view of building up the system so that any subsequent attacks will not be possible, as long as the course of training and diet rules are followed.

The immediate cause of the present attack is ascribed to a lack of frankness in a consideration of matters that involved all parts of the dual organiza-

tion. The fact that it has been a dual organization rather than a single one has made it easily possible to depart from its proper courses and to suffer from the indiscretion.

The present diagnosis, as is the case in all good diagnoses, goes into the history of the patient. This history is more or less familiar to all readers, but certain points well may be brought to attention.

In its infancy, the automobile had to be sold and there were in those days some very keen salesmen. The prospect then was sold on the general transportation idea, but he had to be sold on the make of the car and on gasoline, as compared with electricity and steam. Then came the days when cars sold themselves; the salesman became merely an order taker, and the weighty question before the dealer was the dictation of the limit of credit to the buyer. This state of affairs, going from bad to worse, continued until shortly after the outbreak of the war when, for a period, there was slow buying. In the meantime, the patient had gotten out of condition, he was soft and flabby, and that short period of selling was not sufficient to put him again in training. In a general way,

the condition was made worse by the recognition of the motor car dealer by the banks as a good risk, which permitted a long departure from the cash basis sales, or at most the credit the dealer was able personally to finance.

After this came the late war period, when cars were very scarce and used cars often sold at prices of new ones, because buyers wanted them immediately. Up to this time, there never had been a period, after the automobile was established, when it was necessary to make an analysis of selling. This is well illustrated by the fact that so many passenger car dealers took up trucks and tractors as a war period sales proposition and then dropped them. The buyers of these vehicles were not jamming the doors of the salesrooms and the dealers actually did not know how to go about finding customers. So they decided there was no demand and dropped the tractor and truck.

Selling the Automobile

This situation was interestingly illustrated in a conversation the writer enjoyed with a Ford dealer during the period when he was seeking a war time support for his establishment. He brought out a city map in which his district, halfway to other Ford establishments, was outlined. He had canvassed this district and there was a pin in each building lot to record the number of Fords owned or housed on that lot. He had employed a service salesman who was to report on each of these Ford owners and explain why any of these owners were not customers of this service shop.

"That is fine," I said, "but have you a car sales chart like that?"

"No-o-o," was the answer, "and I do not know just how I would make one. I have never needed it."

There is the whole story. This man, a keen and successful merchant, has never given his attention selling cars.

When the manufacturers came to New York last January to attend the annual show, it was common talk that their greatest interest was in the sales proposition. They said themselves that they were looking forward to the day—regarded as being a considerable distance away—when they would have to sell their cars. They were going to weed out their organizations and build for the future. But apparently they did not get very busy on the job, for the manufacturers were not prepared for the present condition of the market.

This unpreparedness of the automobile sales systems in the recent setback cannot better be illustrated than by the fact that, in an effort to dispose of more cars, some manufacturing establishments wired their dealers and distributors asking them to take more cars. These telegrams followed only by a few days telegrams giving allotments.

To at least some dealers these telegrams were a "bolt from the blue sky," as the dealers had had no warning that they could get even their allotment of cars. Some of them were still under the impression that they would have to go to the factory and "fight" for their next allowance. They were not trying to sell more.

This lack of frankness between the factory and the dealer is not by any means a new factor in the situation and to this cause can be traced many of the difficulties that are now coming to the fore. Since the cars came back on the market after the signing of the armistice, most dealers and distributors have felt they were suspended in midair by a hair, with the manufacturers holding a sword ready to cut that hair. We quote the following from the Summer Merchandising Number of *Motor*

World, printed April 19, 1920, and to date no one has disputed the accuracy of the statement, while many dealers have added their word to the knowledge that it was true:

"A New York distributor of a medium-priced car said the other day that he made a trip to the factory in the Detroit district every two weeks throughout the past year. He is willing, even anxious, to go frequently to the factory for the benefit that comes out of the conference with the makers of the cars he sells but 24 trips a year cut a pretty sizeable hole in his profits. He has had to make the trips, he states, to get cars and in some cases to find out when he can get cars."

While this is quoted from one man, it really is a composite experience. In some cases, distributors have added that they took money with them so that they could pay for the cars then and there, as "the man with the money got the cars."

The point that we wish to make here, is that the distributors were unwilling to trust the factories to report to them the number of cars being turned out and to await the shipments with the confidence that they would get a fair share of them. There must have been some cause for this suspicion and there is only one explanation—a lack of frankness between the factory and dealer.

It was widely discussed at the time of the New York and Chicago shows that these exhibitions were welcomed by the manufacturers, not because they had something new to show, but because it would provide a common meeting ground with distributors and other manufacturers to plan for the upbuilding of the sales plan for the period when the selling resistance curve would turn sharply upward. This period was regarded as being more or less remote and the plans were more or less general and, if one may judge by dealer comment, still of and for the future. At least most dealers will tell you that they have not been given any new leads or assurance by the factories. Apparently, it has been a case of trusting to the leaky roof because it was not raining. There was lacking a frank discussion of the future of the industry.

Cheaper Living Costs

There has been a general attitude of cocksureness among automobile sales departments, in factory, distributor and dealers' sales departments. There really has been little effort to look to the future, and the man who talked of a let-up in sales in the near future was regarded as "rocking the boat." There has been much discussion of the "saturation point," but this was based upon the expressed desires of persons who called at salesrooms, not on the financial ability to buy. We quite agree that the "saturation point" of desire is still far off and it will not be reached until every family has one or more cars, but there are other things to be considered. One is the public sentiment that comes and goes in waves. Just now, the wave is for "cheaper high-cost-of-living."

The public refused to buy the spring apparel at the prices fixed by the manufacturers and these prices had to be brought down to meet the level of public opinion before the public would buy. When the concessions were made, the public began buying. Motor cars have not as yet been reduced in price, and whether they will be or not is not the object of this discussion. We do know that motor car prices have not soared as have those of many other articles, but that is neither here nor there. Public opinion is not easily influenced by small details and it would be a very costly thing to set out to establish present prices of motor cars by proving that they are not too high.

But here is a case where frankness between the dealer and the factory would be of especial value. "What does

THIS article asks co-operation between the makers and sellers of automobiles. It is attempting to bring these two organizations together upon a basis of mutual understanding and frankness, so that the two may work together in overcoming the evils of the present credit situation. In recent months, dealers have been loud in voicing their disapproval of factory sales and production methods. The factories, perhaps, have been just as vociferous in their complaints of dealers' faults. All of this has harmed the industry, as Mr. Jennings points out in this article, and much of the present slowing-down of business may be traced to the lack of frankness between manufacturers and sellers. Let them get together, around a common table, planning for a future in which true merchandising methods will be employed in the sales not only of cars but as well of tractors, trucks, equipment and other automotive products.

the dealer say as to the need of lowering the price as a necessity to stir up trade? Does he think that would do it?" This is a dangerous question to put to retail merchants, as too many of them know only the price argument as a selling force. As long as the dealer himself does not stand the cut, some would advise cutting. Now if a factory had been completely frank with the dealers, the present situation could be well thrashed out to the advantage of both.

One of the peculiar situations that has arisen in the credit flurry is that a good many dealers have been selling cars and trucks on more than one year's time. The banks have insisted that one year must be the limit on time payment sales. One man, who thought he was familiar with the automotive sales situation, said when he heard of this ruling: "That will not harm anyone, it is unthinkable that such periods have been granted for payment."

But he was wrong. The customer could get the time he wanted from many dealers. It was a condition, not a theory. It used to be that pianos were sold on "nothing down and twelve years to pay," according to a popular expression. But when war conditions brought a scarcity of pianos, the merchants took advantage of the situation to strengthen their terms. The piano business is said to be in better shape regarding terms now than at any time since the time payment systems were introduced.

But with the automotive field it was different. Dealers with dozens of customers waiting for cars permitted the sales on terms that were not consistent with reasonable credit, let alone a period when merchandise was scarce. Where was the factory advisor during that period? The reins were very lax, or such a condition would never have arisen. There was a lack of frankness between the dealer and the factory. Had the factory been on the job, the man with the most money would have been getting the machines at the dealer's doors, just as he was at the factory door.

Production figures have been the question of many an earnest debate in the industry. There are some factories where production figures are discussed just as the farmer discusses the yield of crops and there are others—and these number many more than the first named—where factory figures are guarded more closely than the list of unpaid bills. Just why, no one whom we know is able to explain exactly. Once a factory sales manager said that his reason was that he did not want the distributors to know too much about his business. This man was probably truthful and perhaps his reason could be applied to others. But if the factory sales department and the dealer organization were entirely frank with each other, why should not production figures be discussed within the family circle at least, just as the young lady's birthday is celebrated quietly at home and the knowledge kept within that circle.

If this family feeling had existed during the last eight-

een months, the dealer would have known how many cars were being made, how many he was getting, and he would have been assured of a fair proportion, based on population of his district say, and he would not have felt driven to padding his orders to show the factory representative when he asked for a large allotment of cars. Frankness here would have been a great asset because:

The present shrinkage of orders because of cancellations comes largely from padded order lists. There will be no dispute of this. The dealer was required in most cases to show his order or prospect list to get cars, say he wanted a dozen for immediate distribution, and last week he got three. It was easy to pad his list to thirty-six, so that he might get almost his dozen. Naturally, his standing order was increased and when cars began to come in more rapidly, he was forced to cancel his padded figures, and so the house of cards collapsed along with the credit tightening. Altogether this has made a considerable collapse and, chiefly, the cause is a lack of frankness between the dealer and the factory.

In all well ordered scientific papers there is a conclusion. In fables there is a moral. Call what follows by whatever name you please:

It is time to get down to brass tacks in the selling of automobiles unless you want to turn to making trucks and tractors. Let the first step be to get acquainted with your distributors and dealers and get on a basis of perfect frankness with them. Find out how they are running their business and then let them know how you are running yours. How much money is the dealer making, how much effort is he putting into his business? How many cars are you making and what are you doing with them? Does your factory need money, or is it the dealer who needs the money?

As a matter of fact, there has been no collapse of the automobile selling business. Some one has just set the outlet valve at the proper pressure and the sales end is coming down to normal, rather than continuing to run over inflation.

One of the very best signs of the times was the reading at the recent annual meeting of the National Automobile Chamber of Commerce of telegrams from dealers in many sections giving their view of selling conditions. These telegrams were gathered by the National Automobile Dealers Association for the purpose of telling manufacturers of the conditions confronting them. It was an excellent move. It will make for frankness between the two big and powerful associations. It should and must be followed by increased frankness between dealer and factory.

A few factories carefully train men to sell their product. The men so trained are recommended by dealers and return to dealers after a several weeks' stay at the factories. This is as it should be. There should be no sales secrets between dealer and factory if our industry is to go forward with the strength that lies in union.

Farm Show Reveals British Tendencies in Power Equipment

The Royal Agricultural Society exhibit, which has just closed, included trucks, tractors, power implements and farm lighting sets, with both British and American products being shown. Something of the growing demands in England for such equipment are given in this article.

THE seventy-ninth show of the Royal Agricultural Society of England—the oldest and largest organization of the kind in Europe—was held this year at Darlington, some 250 miles north of London. It is an industrial and agricultural center and is famed as being virtually the district which gave birth to the steam locomotive and railway. The outstanding features of this year's show were trucks, tractors and farm-lighting sets. It might be added that the trend of these yearly R. A. S. E. shows points to this display of automotive products becoming more and more a formidable rival to the similar purpose but exclusive truck shows of the official British motor trade body.

In passing, may be noted a few impressions by one who has attended the R. A. S. E. yearly shows almost without a break for over 30 years. During that period, the gasoline truck, the tractor and the small gasoline and kerosene engine for domestic and farm use have developed a larger and more varied trend and scope from the internal combustion engine than was possible to steam power, but what is more important, have revolutionized the industrial outlook alike for mechanical traction and agriculture. It is true that British farming is slow in responding to the claims of the gasoline tractor and farm engine, but the pace now is being accelerated largely, owing to the economic pressure and the Government's promise, in effect, to subsidize wheat growing, etc.

As regards the truck exhibits, the display was noticeable for the variety of utility types, the char-a-banc prevailing, followed by the tipping truck with either hydraulic or an all mechanical gear motion and elevating screw. In one case—a steamer—the lift was by means of a separate small cylinder reversing-valve engine and enclosed gearing.

The appearance of battery trucks on a larger scale than before at these shows was another notable feature. The trend—as yet not very noticeable—was toward pneumatic tires for trucks, the samples on view being mostly on char-a-bancs.

American trucks, including the new "Wallace"—Sam Wallace's new 1½-ton truck which is being assembled here for the British market—had a good display. They were mostly in the 3000 lb. and under class, the larger trucks not finding much demand here since the war, partially because of the recent dispersal of large military trucks.

As usual at these shows, some very good body-work and fittings were to be seen, but criticism was heard of a falling off in the appearance of some of the chassis parts, castings chiefly. In fact, it may be mentioned, comment is rife that the intrinsic quality of later day European chassis, particularly cars, is not what it should be, and in some notable cases is not so good as before the war in regard to uniform dependability.

The Bartle char-a-banc body is remarkable for the ease with which the hood is handled single-handed. This fitting too often is cumbersome and unwieldy, and folds so badly as to invite the rear seat passenger to sit on its folds. The Bartle make-up is a dexterous combination of levers with a self-balanced action. The chassis is Thornycroft and is notable for the dished plate steel wheels, a type likely to be more favored than the open-spoke cast-steel form. Wood wheels for trucks are almost taboo in Great Britain because of the lack of hickory.

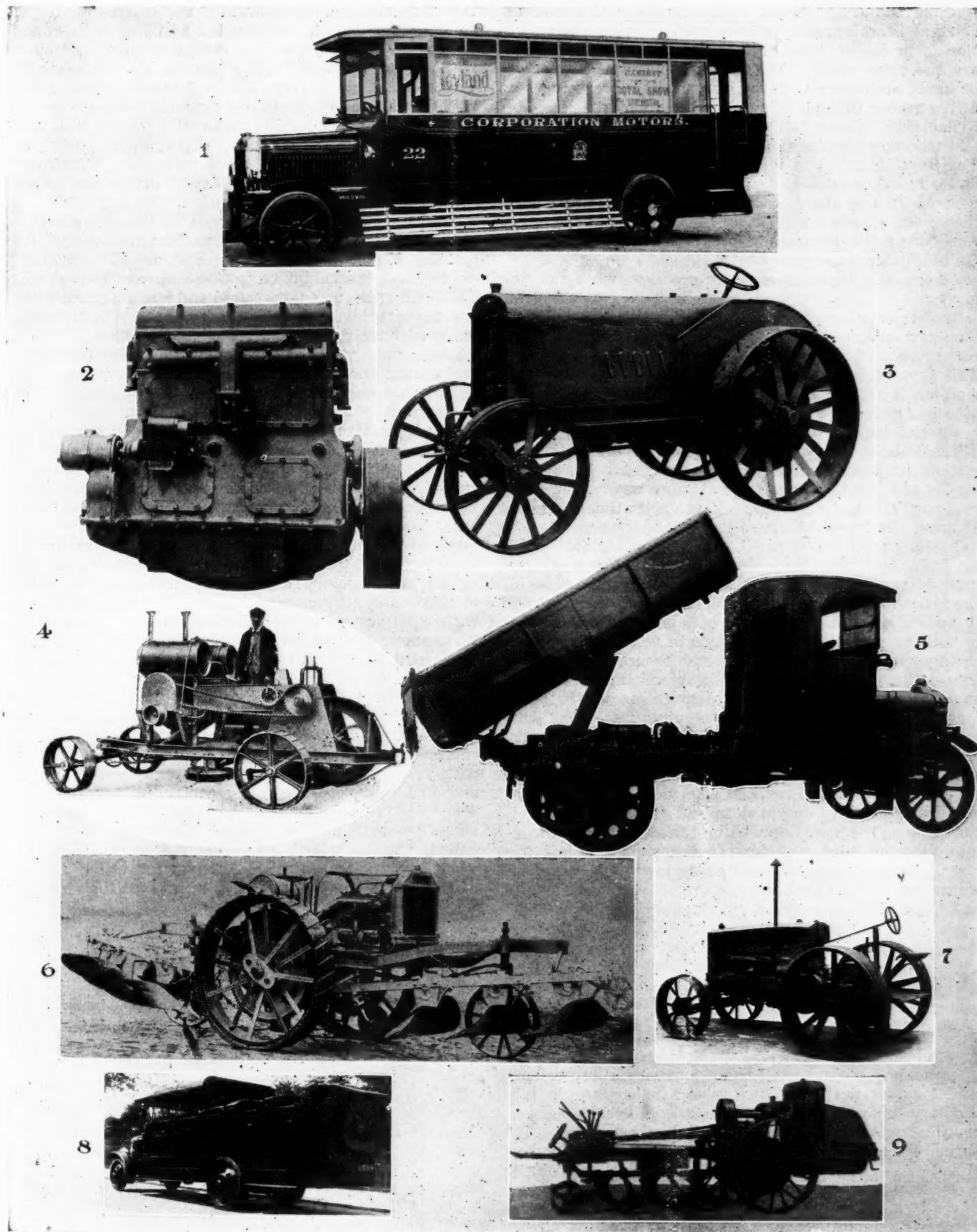
In the display of tractors, the most notable were the Wallis-Cub, as built by the Ruston & Hornsby company for the British proprietary; the "Timesaver," a combination of the land tractor and double-ended tilting plow of the sort used for cable plowing; the "McLaren" kerosene engine cable cultivating set; the "Peterbro," with an adaption of Ricardo's patent engine for kerosene and aluminum pistons, built by the eminent company of Peter Brotherhood, Ltd., at Peterborough; the new six-cylinder Avery, and some half dozen makes of walking plows after the "Beeman" model. The latter are American and received much attention.

About half a score of American makes of tractor were shown, including the "I H C" series, the "G. O." (a friction-driven machine), the "Case" (the European business of which is handled in Paris), the "Fordson" (assembled here and part British), the "Garner," assembled at Birmingham, and fitted with the Garner patent demountable rubber segment tires for use on roads, and the "Parrett," which used to be called the "Clydesdale," by the British importers. The combined and convertible tractor implement, a type of which only, the "Moline," was seen here from the United States, appears to find favor still in Great Britain. This year the number, if not increased numerically, is made more notable by "Boon," which formerly was made by a small firm at Warwick, but has been taken over by Ransomes, Simms & Jefferies, Ltd., one of the oldest and largest steam traction and steam farm implement makers.

The display of small self-contained gasoline and kerosene domestic power sets was impressive as being the nucleus of a big trade that is likely to be more quickly developed than seemed probable before the recent big rise in coal cost with its effects on public service supplies of light and power. About 30 such plants—American and British—were shown—most of them in motion. The best displays were by the Delco and Lalley-Light interests, these exhibits including the plant and a number of adaptions.

There was a good but not particularly impressive show of farm engines and, excepting for some exterior refinements, the British engines are approximating, superficially at least, to the American types. The hopper-cylinder is

Exhibits at the Darlington Show



The above representative pictures of the exhibits show some of the features of most interest to Americans.
 1—The Leyland bus. 2—The Ricardo engine used in the Peterbro tractor. 3—The Peterbro tractor. 4—The McLaren double cable plowing set. 5—The Daimler rear tipping truck. 6—The Timesaver plowing outfit.
 7—Wallis Cub Junior tractor. 8—The Bartle char-a-banc. 9—The Crawley convertible tractor

universally in vogue but the bulk of the British small engines have the rotary armature form of magneto ignition and throttle governing, while the Americans have a trip ignition and are governed on the ignition, or one of the valves. There appears to have been a closer approximation of prices of these engines but generally the British are the more costly. The two-stroke engine appears to be about stationary in favor, very many more being seen at the recent Olympia show of marine motors.

The show was a great success in point of attendance and reports of business done were distinctly satisfactory. The Royal is not a motor car show and the visitors are better representative of business interests. A fair contingent of French and Belgians and some Americans were there, but a larger number of Americans were expected considering the immense list of visitors here from the United States.

Among the more interesting products were the following:

The Crawley convertible tractor-implement, built by the Crawley Agrimotor Co., at Saffron Waldon, Essex, has recently been fitted with a chain driven pulley and shaft. This type of British tractor has a certain vogue in England but is not much used in Scotland or Ireland. The engine is American, with four cylinders. The drive wheels are unclutched when turning is required.

The Daimler rear-tipping truck, with hydraulic tipping mechanism, has a Daimler chassis throughout. The Daimler Co. of Coventry, England, makes but one type of truck chassis. The hydraulic plant is made by the Horizontal Hydraulic Hoist Co. of Detroit.

The McLaren double windlass cable plowing set is built by J. H. McLaren, Ltd., Leeds, England. Two sets are used, identical in layout and size. Each weighs 6500 lb., the weight being distributed equally so that the cable pull is maintained central between both axles. The machine is built of wrought steel of standard sections, with steel castings for all working parts and bronze bushings for the shafts. It is supplied with interchangeable engine shaft and first reduction shaft gear trains, so that ratio may be changed quickly to suit requirements. The drive is from a first to second countershaft by Renold roller chain, with jockey sprocket for taking up slack, thence by a third countershaft and spur pinion gearing into a ring on the cable drum. Provision is made for disconnecting the drum drive, to enable it to run free for paying out the cable as the plow is pulled by the other engined windlass. On the third countershaft is a right and left (opposed) bevel and clutch for driving a vertical shaft and worm gear on the back axle, so the tractor may move itself to and fro.

Advantage is taken of the free running of the respective cable drums, when paying out the cable to use the momentum for restarting the engines. A patent simple clutch mechanism is used which the drivers apply when the plow carriage is within about 20 ft. from its opposite traverse. Thus the engines can be stopped and started without manual effort, and of course, also, it saves fuel. The speed range is from 2½ to 4 m.p.h. by varying the ratio of the engine shaft and first countershaft gearing.

The double set with 900 yards (450 yards on each drum) costs \$12,500, which is about half the present price of a double steam engine and all-plowing set. Provision is made for quickly removing the cable drums and converting the outfit for ordinary haulage.

The new Peterbro tractor, made by Peter Brotherhood, Ltd., Peterborough, England, has Ricardo's patent four-cylinder engine and aluminum pistons. The engine is 4¾x5½ in., the output being 30-35 hp. at 900-1000 r.p.m. The pulley runs at engine speed and has a separate clutch and brake behind the axle which is automatically applied when unclutching. The gross weight is 4800 lb. and the machine can haul a ¾ furrow plow on light land with a fuel consumption of 2½ to 3 gallons of paraffin per hour. It has a two-speed and reverse gear and is all gear-driven to enclosed internally geared wheel hubs.

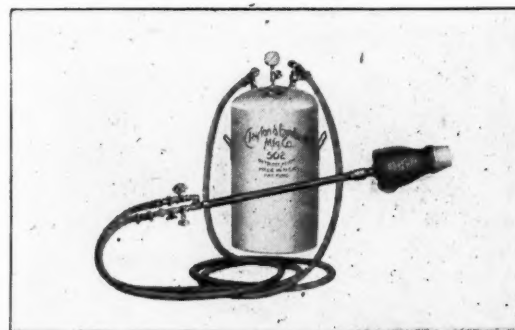
The Timesaver is the first British tractor to combine the advantages of the double ended reversing plow with the light tare of a tractor. There are two forward and two reverse speeds and the driving seat is pivoted to turn about at each end of the furrow. The engine is a Waukesha. The plow frames are pivoted so that their weight tends to lighten the cable-controlled effect of raising and lowering them. The inset picture shows the machine fitted out for traveling roads. It occupies about 30 minutes to make this conversion. Absence of headland turnings enables an acre to be plowed with this outfit in less than 90 minutes. It is handled by the Timesaver Tractor and Implement Co., 33 Coleman Street, London, E. C.

The British built Wallis Cub Junior tractor is built by Ruston & Hornsby, Ltd., Lincoln and Grantham, England. It embodies the layout of the American Wallis Club Junior, but has the Halliday (British) water induction and fuel vaporizing apparatus, enabling the mixture to be diluted with as much as 50 per cent of water vapor. The water and fuel feeds are separately controlled, but the induction effect of the engine is common to both liquids, the water not meeting the kerosene vapor until it is almost entering the cylinder blocks. The British model has four ground wheels and modified Ackerman steering. Because of the fourth wheel, it probably weighs a little more than the American prototype.

Preheating Burner

IN welding operations, it is frequently necessary to pre-heat the work before proceeding with the process of mending. We are illustrating herewith a burner suitable for this purpose. It may also be applied in pipe bending, annealing, heating rivets and buckled shapes, melting metals and in a variety of other ways. The burner is being marketed by the Clayton & Lambert Mfg. Co.

Crude oils, kerosene or distillate may be used for fuel. There is a forced draft of air or steam as desired. The burner is said to produce a steady blue flame of intense heat. Burners of this kind are made in two sizes, one for light and medium work, the other for heavier operations, in foundries or large industrial plants.



Clayton & Lambert preheating burner

New Non-Liquid Storage Battery of Durable Construction

A storage battery with many of the features of a primary cell has long been sought after. This battery has many new inventions incorporated in its construction. In addition to the non-liquid electrolyte feature, the plates are a new invention and may be used with liquid electrolytes.

INVENTORS have long been working on the problem of a storage battery without a liquid electrolyte which would correspond to the primary dry cell in some of its properties. A recently developed storage battery of this type is the Ionite, which is made in both liquid and non-liquid forms. From a technical standpoint, the important feature of this battery is the plate construction. Although complete details as to the processes involved in the manufacture of the plates are not available at this time, sufficient information is at hand to state that the methods differ very radically from those usually employed.

The plate is known as the Williams plate, after its inventor. The grids are of the diamond type and are made of pure lead, no antimony being used for alloying. The active material in its initial form consists of pure sponge lead for both positive and negative plates. The entire forming operation takes about six hours.

From a sales standpoint, the non-liquid electrolyte will no doubt prove to be the most important feature.

The concentration of the acid in the non-liquid battery corresponds to a gravity of about 1.240, which very closely approximates the point of minimum resistance. The non-liquid electrolyte is a gelatinous mass which fuses at about 160 deg. Fahr. When the battery is fully charged, some liquid is visible through the filling tube.

In order to demonstrate the fact that the non-liquid electrolyte does not reduce the capacity of the battery, a very interesting experiment was performed with a Mitchell Model E-40. A 13-plate, 6-volt Ionite, non-liquid battery was used. The passenger load carried totaled close to 700 lb.

The first step was to determine the approximate state of charge of the battery, and inasmuch as hydrometer readings are not possible, the voltage on charge was used as a criterion. The generator on the car was used to supply current and the terminal voltage was about 6.6 volts when the dashboard ammeter indicated a charge of 18 amp. This would indicate that the battery was about half charged.

The starting motor was used to test the discharge rate capacity of the battery, a 300-amp. meter being connected in this circuit and a voltmeter across the battery terminals. The first throw of the meter was about 275 amp. when the starting switch was closed. The ignition switch was then opened and the starting motor used to rotate the motor against the compression. This took about 125 amp. with the motor at constant speed.

The car was then thrown in low gear, the starting switch closed and the car operated as an electric vehicle. The starting current exceeded 300 amp. after which it dropped to about 140 amp., the voltage being 5.9. When the gears were shifted to second, the current again ex-

ceeded 300 amp. instantaneously, but dropped to 195 amp. with a terminal voltage of 5.9. With the gears in high speed, the steady current was about 230 amp. at 5.8 volts. The current varied between 150 and 250 amp. continually, owing to variations in the road and slight grades.

After almost 14 min. of high gear operation, it was necessary to revert to the second, and after the shift was made the current averaged about 180 amp. with a voltage of about 5. This continued for about 6 min., after which the gears were changed to first. The battery gave 150 amp. at 4.5 volts, but this was not sufficient to run the car.

During this test, which lasted for almost 22 min., the battery delivered never less than 150 amp. and the current reached instantaneous values in excess of 300 amp. The average withdrawal was probably somewhat over 200 amp. The voltage held above 1.65 per cell for over two-thirds of the time. The total distance covered was 3400 ft.

The battery was then given a rest of about four minutes, after which it started the engine easily, the voltage falling to 4.8. After a total rest of 6½ min. the battery drove the car 100 ft. further in second.

From this it would appear that the non-liquid electrolyte does not cut down the maximum discharge rate. Assuming the average current to be 200 amp., the ampere-hours furnished by the battery amount to about 26. The dimensions of the plates used were 5 x 5¼ in., which gives an area of 28.8 sq. in., or a total positive plate area per cell of about 173 sq. in. The average current withdrawal therefore was a little over 1.1 ampere per sq. in. The rated capacity of this battery is 130 amp. hr.

A laboratory test on a plate, non-liquid, 6-volt battery, with the same sized plates, showed some very interesting results. This battery, fully charged, showed an open circuit voltage of 6.9.

It was put on discharge at 25 amp. and the voltage immediately dropped to 6.4. At the end of one hour, the voltage was 6.3, at the end of two, 6.2, and at the end of three, 5.7 volts. A terminal voltage of 5.4, or 1.8 volts per cell, was reached at the end of 3 hr. 40 min. The discharge was continued until the end of the fourth hour, when the voltage read 4.7. The current was then reduced to 5 amp. and the voltage increased almost at once to 5.7. The battery carried this load for 1 hr. before the cell voltage dropped 1.8 volts. At the 25 amp. rate the total output was therefore 100 amp.-hr. or over 90 per cent of the rated capacity.

A 13-plate, 6-volt battery using liquid electrolyte and the Williams plate carried 130 amp. continuously for 20 min., the final voltage being 1.65 per cell. In both the foregoing tests new batteries which had just received their initial charge were used.

The recommended charging rates are from 2 to 5 amp. per positive plate with a maximum temperature of 100 deg. Fahr.

Design of the Forward Part of the Automobile

Mr. Mercer takes up the design and layout of the forward portion of the automobile body for those who do not wish to learn body designing but are compelled to advance their work as far as possible before it passes to actual body work. The article also shows some modern trends in design.

By George J. Mercer

IN the designing of a car, there are parts that are respectively left to the mechanical engineer and those that are handled by the body designer. The mechanical work is the first part of the layout and some things must be determined in that department before the body man is called on the job. Of course, it would be better for both to work collectively from the beginning, but frequently this is not done and it is when handling the other man's work that errors are likely to occur.

The writer has instanced several cases lately in which parts were decidedly off hand without this collective effort and the result has been that steering gears have been too short and radiators not suitable for the bodies with which they were to be used. An error of this kind can occur only where facilities are not available for comparison. This may be had from any car on the street but worth while comparisons are drawings made to scale and dimensioned. The lack of these causes the draughtsman to plan for himself and, for that reason, several simple rules are presented here.

The illustrations show the front end of a touring car in three views, the side and top being quite complete, but the front shows only the important parts. What most often leads to confusion is the shape of the radiator. Importance is not given to the fact that body design in general should be considered as a whole, including the radiator, dash, windshield, location of the steering wheel and the location of seating, and all thought of in relation to the car size. This was not possible in earlier models, but now so many body part sizes have become established that it has become an easy matter to establish simple formulae to enable any one to lay out correctly the forward end of the car and to feel that it is not a matter of guess work, but of systematic designing along theoretical lines. It is not to be inferred that the design is simply a matter of calculation. The method should be a matter of procedure along careful lines to establish a base, which may be revised to suit the eye, and, if the foundation is established, the whole will be in harmony.

The shape of the radiator is most often a complete or partial adaptation of some make of car. The width and height are, too, fixed merely by guess. The method of

the writer is to come at the radiator sizes gradually, as follows:

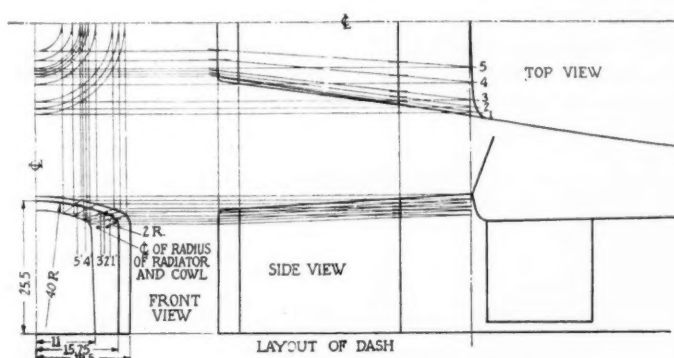
First—Locate the steering wheel, the driving seat and rear seat, keeping in mind that the space is to be divided so that each occupant may have a fair share of the room. On a car with short wheelbase and a five passenger body, the driving seat cannot be put too far back or the entrance space to the rear will be cramped. The dimensions as shown are not iron bound but they will give a fair average of comfort. The rear seat is about half way forward of the center of the axle. In fact, for a car that is not intended as a sport model, the sizes shown cannot well

be improved but, as was mentioned, they are subject to any changes desired, except the distance between wheel and seat back and cushion. These might be a trifle greater but never less for average persons.

Other standard dimensions are the thickness of cushions, thickness of the driving seat back and its angle or slant. Also, it is wise to speak of the drop in the seat cushion from front to back. As shown, this is 2 in., and is the

maximum now used. There is a tendency to make it less, but the frame on which the cushion rests is tilted 1 in.; therefore, the actual slope to the cushion itself is 1 in. The seat is more comfortable when tilted slightly and, in addition, it increases the height of the seat back, which should be 16 in. This can be had without making the top conspicuously high above the body side only by dropping the cushion at the back.

Second—Establish the height of body side, cowl at rear end and radiator. We establish the body side at one point first. An average height, but not a fixed dimension, is to have the body side line across with the bottom of the steering wheel or in this case 22 in. high at about the location of wheel. The height of the radiator is a matter of procedure; from 24 to 26 in. above the frame is regular—for the illustration, we have settled at 24 in. Four in. forward of the wheel, draw a slant line that represents the back of the windshield. This usually is 22 deg., but it can be anything approximating such an angle. Above the top of the radiator draw a horizontal line that will intersect with the slant windshield line and the intersection is the top rear of the cowl. Join this



Layout of front part of automobile

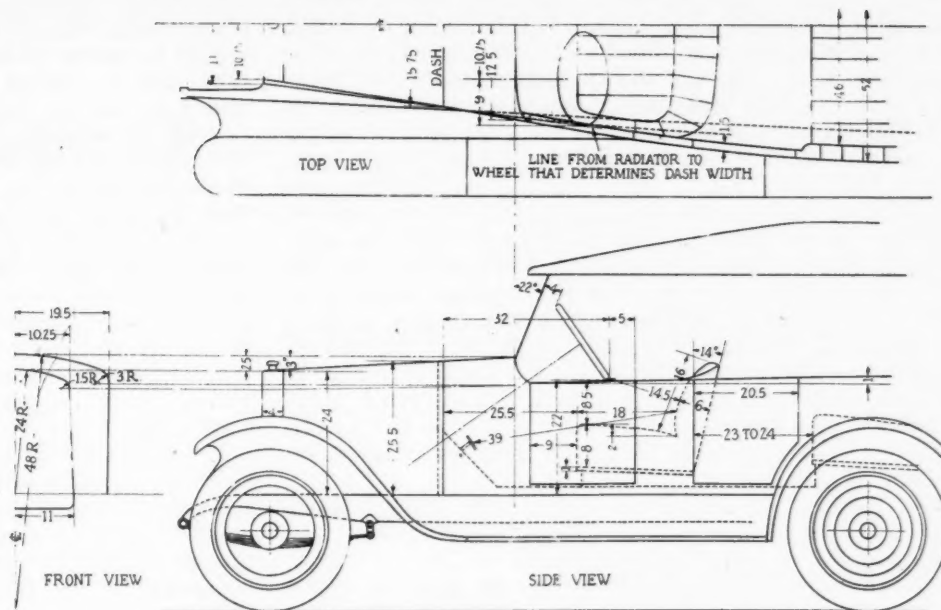
point with the established radiator height and the top line of the hood and cowl is formed.

The rule for determining how much above the radiator height to make the horizontal line is to have it from three-fifths to two-thirds the width of the radiator. Another way is to consider this as averaging 3 deg. from the horizontal, and good practice is to have it slightly over instead of under 3 deg. We have now established the cowl and hood line, its length and the front body height.

We complete the body side view by laying in the door positions, continuing the body top line rearward and raising it until it approximates 1 in. above the front dimension at the center of the rear wheel. The width of the doors is an average of 20 in. This can be more or less, according to the size and proportions of the body. The rear of the front door should be not less than 4 in.; better would be 5 in., from the back of the wheel. This is to make easy entrance when the left side is used. The illustration shows the door width of $20\frac{1}{2}$ in. and this provides 9 in. clear space between the front of the seat and the door pillar. It is very important to provide room to pass the feet in front of the seat both getting in and out.

Third—Establish the widths. We do not make the width of the body at the rear more than what will just contain seat room for 3 people. On practically all cars, the rear cushion is placed between the wheels. The body, at the low point where the cushion rests, can be only as wide as the clearance between the tires and body side. The distance between tire centers is 56 in.; the average tire size is 4 in. and the clear space between the inside of tire and the body side averages $2\frac{3}{4}$ in. Therefore, we subtract twice one-half the tire size, which will be 4 in., and twice $2\frac{3}{4}$, which is $5\frac{1}{2}$ in., or $9\frac{1}{2}$ in. from 56 in. This leaves $46\frac{1}{2}$ in. as the body width at the wheel height. As the framing is eliminated at this point, we have only to consider the thickness of the body panel of 20 gage metal, and the minimum of trimming material, so that our cushion can be 46 in. wide. The thickness of the framing and trimming material on each side beyond the cushion above the wheel housing need not be over 3 in. on each side. Therefore, the total width of the body at the widest point is 52 in. over all, the widest part generally being at the center of the rear wheel.

The next operation is to establish the width of the radiator, dash and line of the hood side. Establish a temporary width at the steering wheel. The center of the wheel from center line of the body averages $10\frac{3}{4}$ in. The half width of wheel is 9 in. and the body should be the thickness of the framing, or $1\frac{1}{2}$ in., beyond the wheel. So, we have a total of $10\frac{3}{4}$ plus 9 plus $1\frac{1}{2}$ or $21\frac{1}{4}$, as the half width of the body at the steering wheel. This also is the half width of the radiator. As we do not make the radiator sides perpendicular, but taper the line approximately $\frac{3}{4}$ in. each side, we subtract 3-8 in. each side, or $\frac{3}{4}$ in. across for the top, and add $\frac{3}{4}$ in. for the bottom, the radiator will be 22 in. across at the frame and $20\frac{1}{2}$ in. across at the top where the corner radius starts. This is shown so dimensioned on the front view. Lay these points on the plan view and from the 22 points, or half width marked 11 in., draw a line that intersects the rim of the steering wheel. This will be the side line



The assembly layout

of the hood and the width of the dash. The body side line is then drawn to meet the dash, making it as near straight as possible and using a slight reverse line near the intersecting point and keeping the body width at the wheel as near $1\frac{1}{2}$ in. beyond the rim, as is feasible. As shown, the line is faded slightly at the wheel to get the straight effect on the body side.

Fourth—Complete the radiator and cowl shape on the front view. The side line and the height in the center of both have been determined. The effect desired must determine the radius of the radiator top. For the example, the height above the frame is used, or a radius of 24 in. and at the corner $1\frac{1}{2}$ in. radius has been used to join the side and top lines. Next we determine the top shape of the cowl at the rear. We have already the width of the plan view, and the height on side view. For this example, we use a radius for the top of double that used for the radiator, or 48 in., and for the corner again double that used on radiator corner, or 3 in., to join the top and side line. Transfer these center points to the side view and connect one to the other. It will be noted that this line, which is imaginary, corresponds to the slant of the top line of the body and a hood laid out proportionally as shown, will have the corner round. It will start on a line that carries the body line straight to the front without displaying the studied effort of creating a sharp edge along the hood. The reason the body side is raised on the top line, at the rear, is that it looks best when this line noses down slightly toward the front, and also to obviate the chance that, when the rear of the body is excessively loaded, the settling of the springs will carry the rear of the body lower than the front and to conform to the hood line which should be lower at the front.

The next point is to determine the shape of the dash from the lines forward and rear of it.

But, before making this explanation, it is well to make note of the present tendency in design. To get the streamline effect, there has been undue effort toward carrying the body line through to the radiator. This has been difficult to accomplish on many cars and the plan has miscarried more often than it has been successful. As a consequence, there is a tendency to depart from the hood with a straight edge and revert to the slight round effect, with the top of the body side made flat and having

a slightly rounded outer edge. The harmony of design obtained when the cowl, hood and radiator have a radius virtually concentric and the turning point of the round parallels the body side line, is important in creating the continuous straight line effect of the side. If it is desired to have a larger radius for the corner, it is advisable to carry the radiator and cowl line higher. In fact, the rounder on the corners, the higher the forward part of the car should be, so as not to have to bend the body side below the body top line. It is not meant that the round should never come below the top edge of the body but it should be very slight and should be avoided as much as possible. Perhaps it could be added that the present tendency is to use more the oval than the true round on radiator and hood corners and top. This is not a reactionary movement back to the old round lines but a combination of the straight look with moulded surfaces to obtain the result.

Fifth—The correct layout of the dash is the subject of the illustration so marked. This is very important, as the dash is similar to the center girder of a roof. It must carry the same conformation as the end members or the effect of the whole will be disappointing. On the first illustrations, the shape and radius of the radiator and cowl at the rear were established. The dash, which is between these points, is likewise determined by drawing a sufficient number of lines, long enough to pass through the plane of the radiator, dash and cowl. On the three views the intersection of these lines with the dash line will give as many points on the front view as will be needed to establish the radius of the top and corner.

This is a simple operation in geometry and briefly it is to try out the smallest number of lines that will suffice to avoid confusion. Commencing with the top view, we have made use of five lines, and at the intersection of the dash they are so enumerated. At the intersection of the radiator and cowl, these points are carried over and down to the front view and so over to the side view. Lines connected between the points are found. Then, the intersections of these lines with the dash on the top and side views and with the lines on the front view will give points that indicate the shape of the dash. A radius is

found that will meet these points and as shown, for the top 40 in. radius is used and for the corner 2 in. radius, the width as well as the height has already been determined on the top and side views.

With the majority of cars, the hood rests on the top of the cowl at the rear. At the radiator, it is level, resting in a depression. The reason it comes over at the rear is that there is play in the hood length when the car is running and the frame bending between its supports at both axles causes the hood to ride back further on the cowl. The easiest way to allow for this is to have the hood overlap. Therefore, when the design follows that of the illustration, it is usual to have the forward end of the cowl, made concentrically smaller by the amount required for lacing and clearance, usually 5-32 in. The cowl sheet is not depressed like a step but is tapered.

It is true that not all cowls and engine hoods are made so that the illustrations given of developing the line conformation will apply directly but these rules can be made to apply on most hoods by moving the base line at the rear forward until a straight line on the side and top is reached. Body designers use other, and at times more elaborate systems, but the idea is to apply a simple method that will have practical value for those who do not wish to learn body designing but are compelled to advance their work as far as possible before it passes to the next stage.

Observation of the side line of cars in use will show readily the value of having the bending line of the hood conform to top side line of the body. The effect of the rounded corner, when well done, is almost as decided as when the straight edge is carried along the hood. It is infinitely more satisfactory than when the straight line is not well executed. It also is a cheaper manufacturing proposition for less than large quantity production and at all times it makes an easier assembling job.

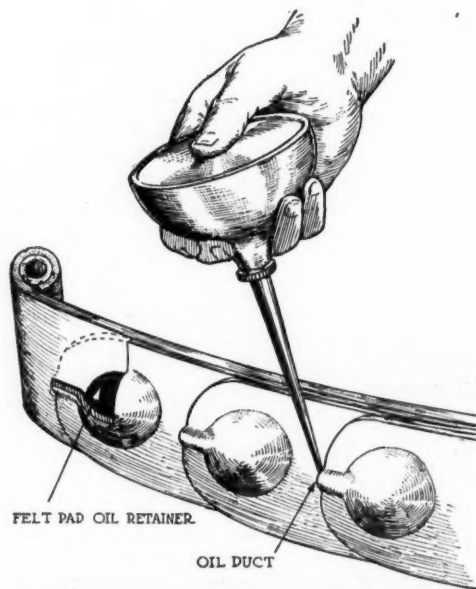
The writer wishes to emphasize again that these rules are for guidance only and are not binding as to measurements. They are, however, a direct method that will enable any one to make quickly the preliminary layout and establish a base from which the final decisions can be formulated.

The Lubrication of Automobile Springs

THE springs are the only moving parts on the car which are not provided with some form of lubrication. When ordinary springs are first manufactured they are coated with a graphite and grease compound, and to renew it the leaves must be spread. Many attempts to use oil as the lubricant have been made in the past, as squeaky springs are a constant source of annoyance and trouble to the owner.

The Dilso system is a simple and ingenious means of keeping the oil in the springs at all times. A cup-like depression is stamped near the end of each spring leaf. When the spring is assembled, a piece of absorbent felt is inserted in each cup and saturated with oil. The felt is cut thicker than is necessary to fill the cup, and so is under pressure. As the leaves move on each other, the kneading forces the oil out of the felt and capillary action spreads it over the surface of the leaf. For convenience in replenishing the oil in the cups, a groove is stamped on the end of each leaf, forming an oil duct that leads to the cup.

As may be easily surmised from the illustration, this device must be built in the car and cannot be added as an accessory.



Dilso system of spring lubrication

A One-Ton Bevel Gear Axle for Commercial Speed Wagons

This design is planned for use with pneumatic tires and a high torque engine and is claimed to be sturdy and economical. Roller bearings are employed throughout the design. The drive pinion is supported on both sides by bearings instead of being overhung.

A ONE-TON bevel gear drive truck axle which has been designed and built throughout for the speed wagon type of commercial car has been recently brought out by the Eaton Axle Co. This design, which will be known as Model 1000, is planned for use with a high torque motor and pneumatic tires and is claimed to combine sturdiness, speed and economy to a marked degree.

This axle is of the semi-floating type, the axle shafts being designed to slip the wheels under full normal load without overstressing. The wheel load is carried on a single large taper roller bearing, adjustably mounted in the end of the housing, and securely locked in place. The inner ends of the axle shafts are splined with ten splines to engage the differential side gears, the ends of the shafts being butted together to take care of the side thrust on the rear wheels.

A pressed steel axle housing of conventional form and generous proportions is used, with a square section at the spring seats, thus allowing for adjustable spring centers.

The driving gearset is of the spiral bevel variety, the gear and pinion having 43 and 7 teeth respectively of 3.37 diametral pitch. An optional gear ratio of $5\frac{1}{2}$ to 1 is also provided for. The pinion is mounted between two taper roller bearings instead of being overhung as in the conventional types of mountings, thus equalizing the load of the bearings and making for longer life and service.

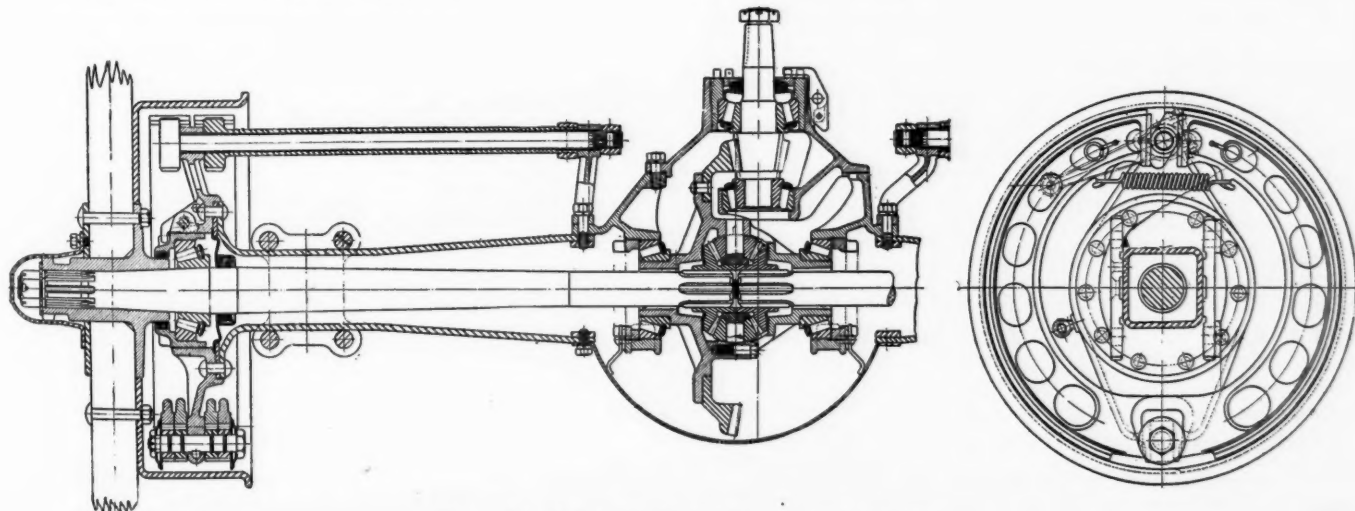
Provision is made for adjusting the driving gear axially, by means of adjusting nuts on the differential bearings. These nuts are locked by an ingenious device, which is retained in place by the back cover of the housing, and as the cover may not be replaced on the housing until the bearing locks are in position, all possibility of assembling without locking is precluded.

The pinion adjustment is accomplished by the use of shims between the pinion carrier and the differential carrier. This type of adjustment is the simplest and at the same time the most reliable form of adjustment, for after the correct setting has once been made, there is no possibility of the gearset getting out of adjustment.

Double internal, cam operated, self-centering shoe brakes are provided, operating on 16-in. pressed steel brake drums. The brake operating levers are splined and clamped to their respective shafts, so that adjustment for wear may be made.

The axle shafts are of chrome nickel steel, heat treated. Driving gears are case-hardened carbon steel, while the pinions are of nickel steel, case hardened. Differential carrier, hubs, brake anchors and brake shoes are of malleable iron.

AN alloy for the resistance elements of electrical instruments, described by F. Weimar, of the Bureau of Standards, Washington, has the following composition: Copper, 84.2 per cent; aluminum, 4.2 per cent; manganese, 11.5 per cent; nickel, trace; iron, trace. This, it will be observed, is similar to manganin, except that the nickel is replaced by aluminum. In so far as the resistivity and temperature resistance coefficient are concerned, this material is practically the equivalent of manganin. The thermo-electromotive force against copper is less than that of manganin against copper. The value is about 0.3 micro-volt per degree Centigrade, which is only about 0.1 as large as that of the best manganin. This material is therefore considerably better than manganin in this respect, which is an important one where the resistance is of very low value.



Eaton bevel drive axle for 1-ton speed wagons

Electric Truck Transportation as Developed in Germany

This article takes up the problem of transporting goods and foodstuffs in the interior when the supply of gasoline is low and skilled drivers scarce. The heavy electric truck was chosen as the solution. The principal feature is the standardized storage battery and charging methods adopted.

By Dr. Ernst Valentin*

DURING the war, short distance haulage in Germany became constantly more difficult as the stock of horses was reduced by the enormous demands of the front, and as the operation of gasoline motor trucks was hampered more and more by the extreme shortage of motor fuel and the lack of skilled drivers. In consequence, the Department of War, in agreement with the civil authorities concerned, worked out a pretentious plan, according to which hundreds of heavy electric trucks were to be used for the transportation of mer-

chandise within those numerous large German cities which have well paved and generally level streets. To those familiar with the subject it was clear from the beginning that this attempt to introduce the electric truck on a large scale for the transportation of merchandise, would lead to negative results, the same as previous attempts made in Germany and elsewhere, if no efforts were made to eliminate the necessity of recharging the storage battery in the truck. The practicability of electric truck service is very closely bound up with the cost of maintenance of the

storage battery. The imperfections of the storage battery are responsible, more than anything else, for the unpopularity of electric truck service. For a truck owner who has only one or a small number of electric trucks in service, the maintenance cost of the battery comes quite high, chiefly because of the fact that only that number of vehicles are ready for service at any time, for which serviceable storage batteries are available. To make the electric truck practicable in the large cities, it was therefore decided that the battery should not become the individual property of the truck owner, but, on the contrary, should only be leased to him, and at the same time should be standardized in such a way that any battery would readily fit into any one of the hundreds of trucks which it was intended to put into service. In order to achieve this end, it was not only necessary that the dimensions of the storage batteries themselves should be standardized; the devices employed for fastening the battery in the truck and the battery handling apparatus, which is necessary for removing the discharged battery from the truck and replace the charged battery, must be designed along standard lines. The object aimed at was that any of the numerous vehicles could leave its discharged battery at any of the charging stations planned, and receive for it a new, fully charged battery.

In Berlin, for instance, it was planned to provide 12 such charging stations, located about six miles apart. In this way the operating radius of an electric truck, which, if the battery is confined to the vehicle, does not exceed 25 miles, could be increased considerably and almost without limit, for the trucks could be driven within the boundaries of Berlin *ad libitum* without running any risk of becoming stalled en route with a discharged battery.

The drivers were instructed to drive to the nearest

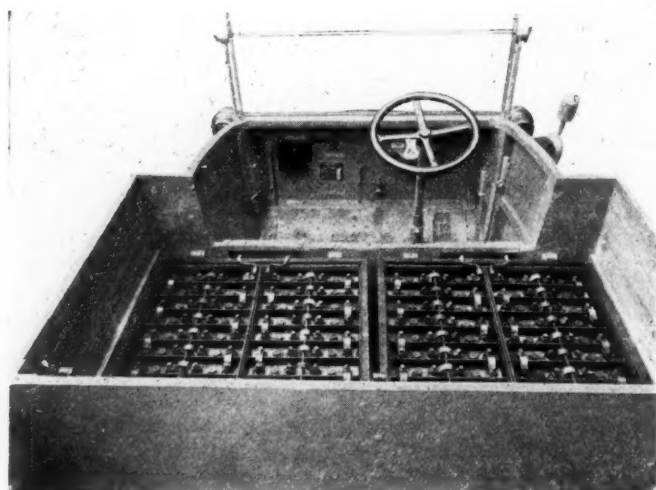


Fig. 1—Looking down upon the battery after the driver's seat has been removed (Bergmann Electrical Works)

chandise within those numerous large German cities which have well paved and generally level streets.

To those familiar with the subject it was clear from the beginning that this attempt to introduce the electric truck on a large scale for the transportation of merchandise, would lead to negative results, the same as previous attempts made in Germany and elsewhere, if no efforts were made to eliminate the necessity of recharging the storage battery in the truck. The practicability of electric truck service is very closely bound up with the cost of maintenance of the

*Technical Adviser to the Department of Transportation of the German Government.



Fig. 2—Running gear on the 5-ton electric truck of the Bergmann Works

charging station in the evening before going home or in the morning before starting out on a trip, and also at noontime, in order to exchange their batteries, which could be accomplished quickly and without material loss of time, on account of the standardized battery handling apparatus.

In this connection, it was of importance that all of the vehicles belonging to this organization were standardized to such a degree that the frame for carrying the battery was always located in the same place. After numerous and thorough experiments, the frame under the driver's seat was selected as the location best suited for the battery, and in view of the great weight of the battery required for such heavy trucks, it was decided to use two separate trays each containing 40 cells of 250 ampere hours capacity, an operating pressure of 160 volts being figured with. With a single charge of the battery, an average distance of 37.5 miles could be covered. As may be seen from the illustrations, and especially from Fig. 1, the driver's seat can be tipped over, forward, or can be entirely removed, whereupon the space above the battery becomes entirely free and the battery can be lifted out of the truck. Batteries and trays together weigh about 3300 lb.

One of the reasons for the decision in favor of over-slung batteries was the desire to get the batteries away from the exposed position below the frame where they are easily injured by stones, etc. In this way, a comparatively large road clearance was secured. The choice of an 80 cell battery rather than the more commonly used 40 cell battery, was based on the consideration that with the higher voltage the working current is reduced by one half, and, consequently, the control devices can be smaller in dimensions. Whenever the current is interrupted in service, the arcing is less with the higher voltage, and consequently the wear of the contact points is reduced. With 220 volts continuous current, the batteries were normally charged with the two trays, that is, 80 cells in series, but where only 110 volts continuous current is available, it is possible to connect the two series of 40 cells in parallel, which, of course, doubles the charging current required. The battery trays were arranged by the front wheels. This results in a suitable weight distribution of the fully loaded truck between the two axles, about one-third of the total weight being carried on the front axle and two-thirds on the rear axle. The frame which carried the box in which the battery trays were located was made of pressed steel angles and was riveted to the chassis frame of the truck, which latter was also of pressed steel (Fig. 2). There was the further advantage in the arrangement of the battery above the truck frame, that in case of any

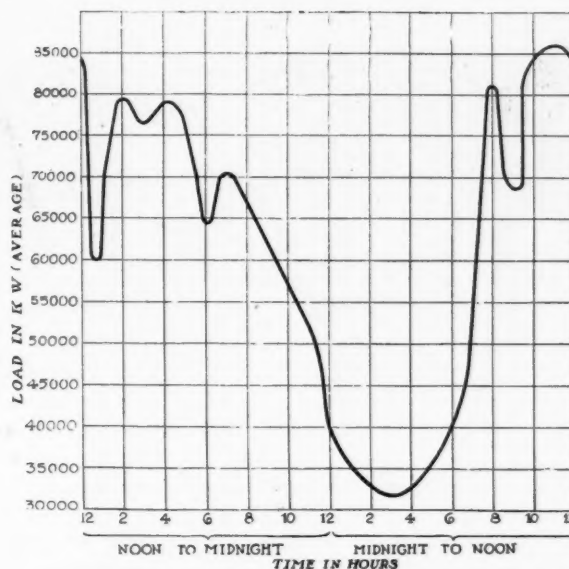


Fig. 3—Daily load curves of the Berlin Municipal Electric Station

trouble at the battery terminals while the vehicle was on the road, the driver could readily get to the terminals of the individual trays without being obliged to remove the battery from the truck.

As already pointed out, one of the considerations which led to the selection of the electric truck rather than the gasoline truck was that Germany did not command a sufficient number of trained drivers to be able to meet, in addition to the very considerable demands of the army, the demand for drivers of commercial vehicles for civilian purposes if these were of a type necessitating specially trained men.

Owing to the simplicity of control of the electric truck, it was possible to employ drivers who, aside from skill in steering, did not possess any special knowledge of the trucks. It was found a good plan to employ horse drivers who were familiar with the city and who could be entrusted with the electric truck without any special instructions. It was even intended to train women as drivers of electric trucks, the same as they were employed for operating street cars; a special school was established for the purpose, and the plan proved entirely successful.

As these electric trucks were also to be used for the transportation of foodstuffs, it was important, and one of the advantages in favor of electric trucks is that in their case the drivers do not have to handle oil, grease,

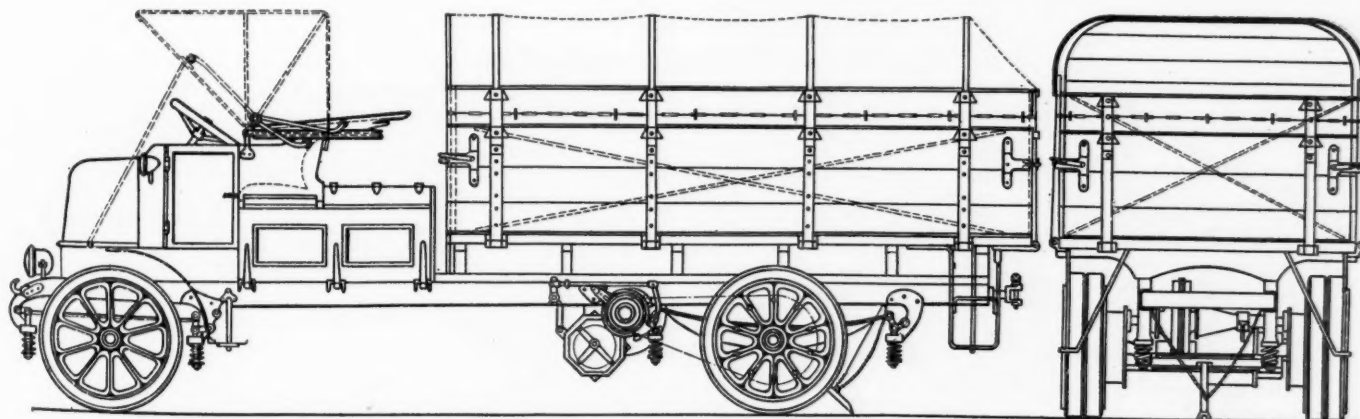


Fig. 4—Side and rear elevations of 5-ton Hansa-Lloyd electric truck. The battery space and the battery itself are standardized

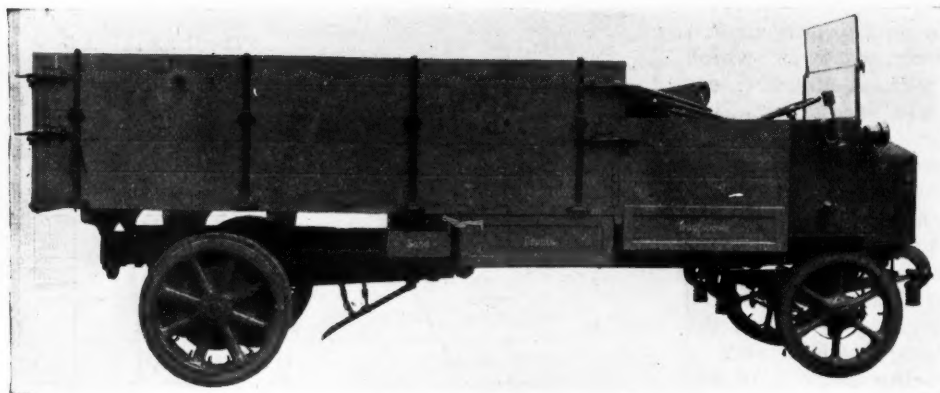


Fig. 5—Electric 5-ton truck complete

gasoline, kerosene, or other soiling substances, and that therefore both their clothing and their hands would be clean, which may be regarded as a great advantage in the transportation of food.

One other factor which was of importance in the selection of the electric truck was the fact that the electric stations, which during the war, on account of the enormous industrial activity, were worked to the limit of their capacity during day time, had considerable excess capacity during the night. It is a well known fact that an electric supply station can produce electric energy the cheaper the more uniform the current consumption, that is, the more the peaks and valleys of the consumption diagrams are smoothed out. In Fig. 3 is shown, for purposes of illustration, the average load diagram of the Berlin municipal electric plant. It will be seen that, beginning at 8 o'clock at night, the load drops quite abruptly, and it attains its normal value again only between 6 and 8 o'clock in the morning. From an economic standpoint this diagram could be materially improved if the storage batteries of a large number of electric trucks were charged from the station during night hours.

The annual energy consumption of a 5-ton electric truck may be put down at 5,000 kilowatt hours, which corresponds substantially to the load of 1300—25 candle power incandescent lamps. It will be seen from this that, from the standpoint of a better utilization of elec-

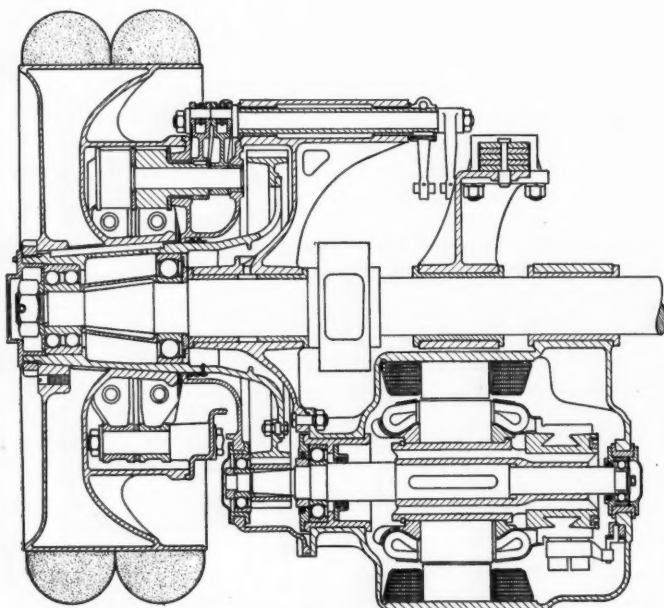


Fig. 6—Section through motor, drive and rear wheel

trical stations, the introduction of electric truck service is of great importance, especially at the present time, when it is necessary to make the best possible use of all available fuel, and especially of coal. One other factor which helped to decide the German War Department in favor of electric truck transportation was the consideration that in service in a big city a gasoline truck uses a relatively large amount of fuel, first, because the trucks are often required to come to a stop in the street, especially at crossings, without it being possible for the driver to shut down his engine every time, and, second, because there is a large waste of fuel in driving to and from the railroad stations, where the trucks are often required to stand in line for hours at a time before they can get to the loading platform. Drivers of gasoline motor trucks in almost every case let their engines run during the entire time, partly because they are too lazy continually to get out of the seat and crank the engine, and also because in many cases the individual trucks in the columns are standing so close together that it is practically impossible to start the engine without delay. At present, practically none of the trucks in Germany is equipped with electric starters.

A final reason for the selection of electric truck service was the fact that Germany, as a result of the blockade, got only very small quantities of gasoline, which was almost exclusively used for the air service. For automobile use, nothing but mixtures of benzol and heavy fuel oils was available. During the cold season, operation with these fuels caused considerable difficulty. Starting of the motor when cold was especially difficult and tedious. In cold weather the fuel consumption was so high that in the case of a heavy motor truck, one had to figure with a fuel consumption of one liter per kilometer (about 2½ miles per U. S. gallon). In this connection also electric drive was advantageous.

In the same way that Germany suffered from a great shortage of motor fuel, there was also a severe shortage of the special oils necessary for internal combustion engines, and they were hardly obtainable. For electric motors use could be made of ordinary low grade lubricants without difficulty. On the other hand, it was possible to figure with low wear of the parts, as the electric motor has no reciprocating masses like the gasoline engine, but only rotating parts.

Fig. 4 shows an assembly drawing of one of these

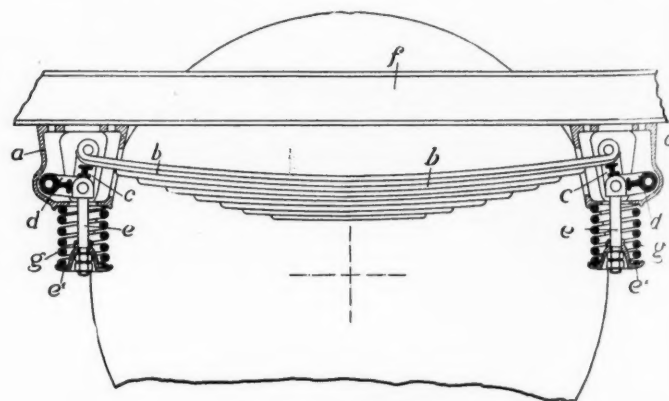


Fig. 7—Bussing supplementary springs

5-ton electric trucks and Fig. 5 is a photograph of same. In front, where the engine is located on a gasoline truck, there is mounted the control apparatus under a sheet metal hood. Then, behind the pressed steel dashboard, which is provided on the left side with the door to the driver's seat, follow the steering gear and the driver's tipping seat, which is wide enough to accommodate, in addition to the driver, two other persons. As already mentioned, the driver's seat is tipped forward when it is desired to remove the battery trays from the truck and replace them with new ones. Back of the battery tray comes the regular platform body.

The truck wheels were the customary cast steel wheels, as may be seen from Fig. 6 and some of the other illustrations. As Germany could no longer produce solid rubber tires, on account of the shortage of crude rubber, combination wood-steel tires were pressed on to the wheel rims, the same as were used on military motor trucks with gasoline engines, and as have been repeatedly described in AUTOMOTIVE INDUSTRIES. At the end of the war, when solid rubber tires could again be had, these combination wood-steel tires could be readily removed from the wheels and replaced by rubber tires.

In order to protect the trucks as much as possible against the violent vibration resulting from the use of these combination wood-steel tires, all of the trucks were equipped in front, and a number of them also in the rear, with a supplementary coiled spring.

This spring mechanism (Fig. 7) consists of a vertical guide *c*, rotatable around the spring rod, *e*, in which guide the end of the chassis spring *b* has a bearing, and of a horizontal guide *d* which is rotatably secured to the rigid spring bracket *a* on the vehicle frame *f*, which latter guide serves to hold the spring rod in a vertical position. The spring rod with the washer *e* is connected to the spring bracket *a* of the vehicle frame through the helical spring *g*.

As regards the selection of the drive and also of the electric motor, the different firms were allowed an en-

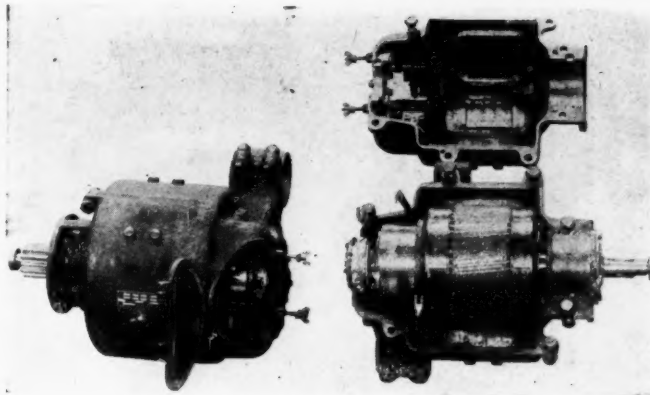


Fig. 10—Motor of the Bergmann Works, with the housing shown both closed and open

tirely free hand. It was assumed, on the one hand, that too much delay would be caused by too great a degree of standardization, as it would eliminate the use of patterns already in existence, and, on the other hand, that the vehicle motors of the large electrical firms were designed for a particular kind of drive and could not well be used with another. In Fig. 4, for instance, is shown the single motor drive of the Hansa-Lloyd Works of Bremen. In this case a single motor, arranged transversely at the center of the chassis, drives a jackshaft in the same way as in conventional gasoline trucks. From the jackshaft, which contains the differential gear, the rear wheels are individually driven through roller chains.

In the truck manufactured by the Bergmann Electrical Works of Berlin, illustrated in Fig. 5, two electric motors are so arranged on the rear axle that each motor drives one of the rear wheels by means of an enclosed gear (Figs. 2, 6, 8 and 9.) The motors, as well as the rear wheels, are fitted with ball bearings. The

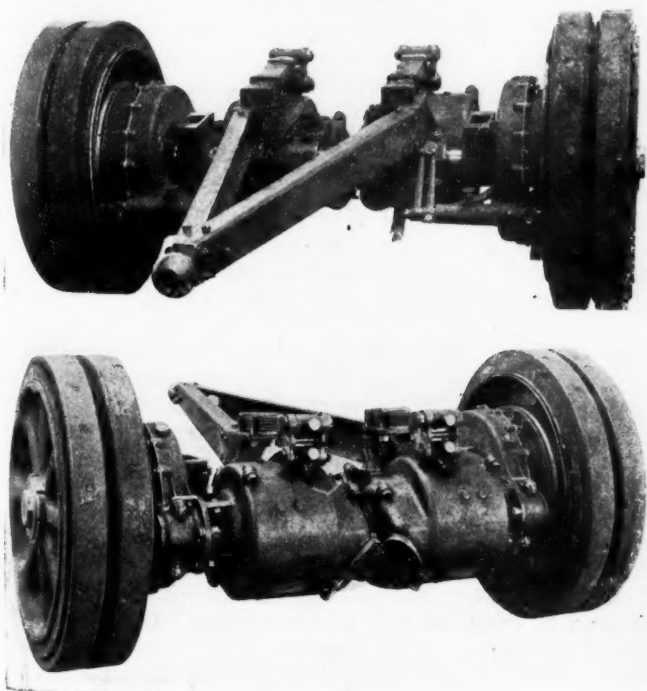


Fig. 8—Mounting of the motors on the rear axle in the Bergmann truck (front view)

Fig. 9—Mounting of the motors on the rear axle (rear view)

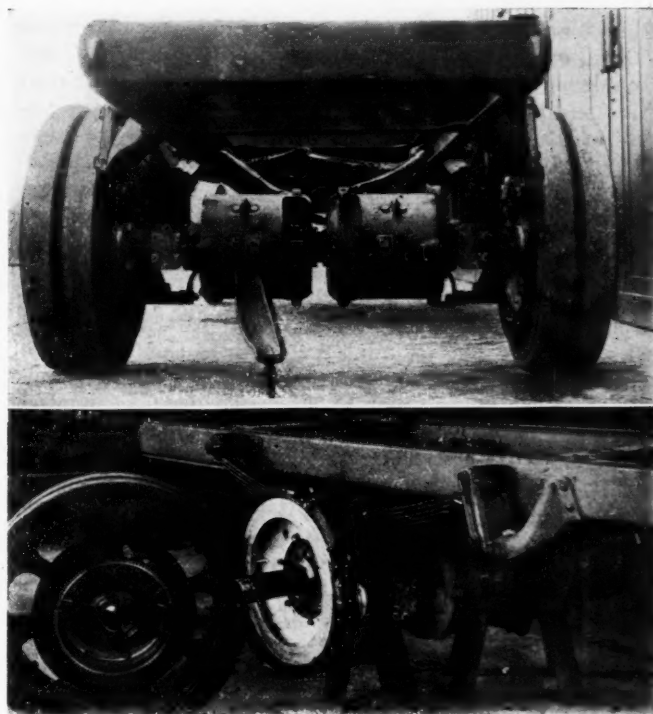


Fig. 11—Rear view of truck chassis of National Automobile Co., equipped with A-E-G motors
Fig. 12—Mounting of motor and arrangement of brake and transmission in the N. A. G. truck

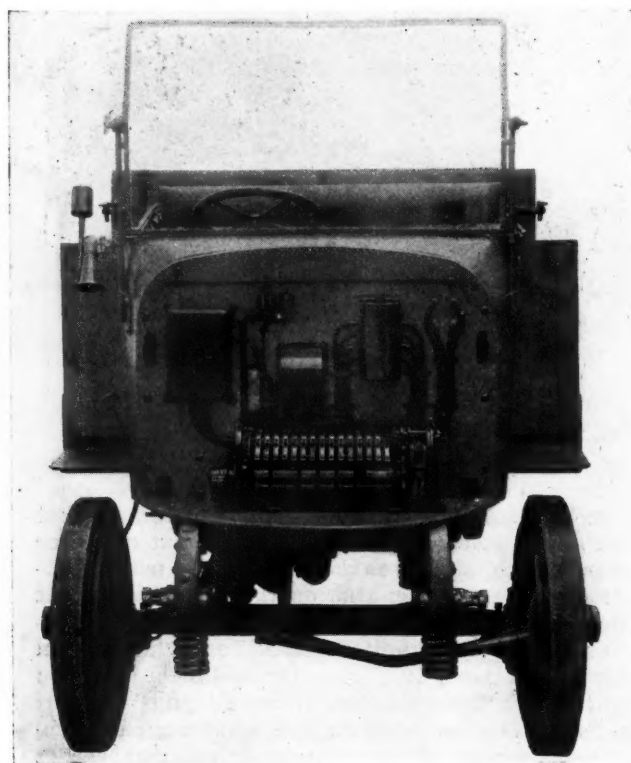


Fig. 13—Control apparatus of Bergmann, with hood removed

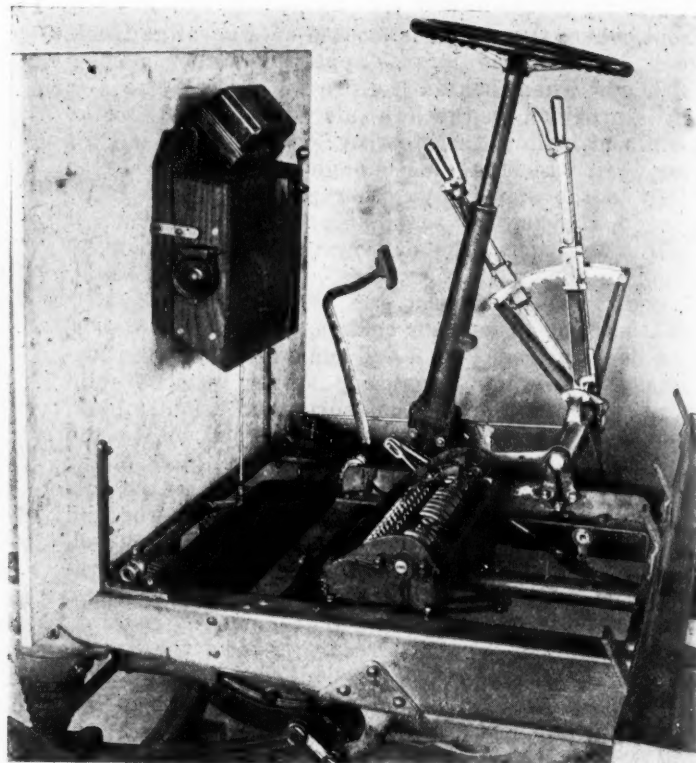


Fig. 14—Arrangement of controller drum and linkage on the N. A. G. truck

housing of each electric motor is pivotally mounted on the rear axle by means of bronze bushings. A triangular radius rod of pressed steel, terminating in a ball at the forward end, transmits the driving thrust from the rear axle to the frame, which latter is provided with a suitable socket at the center of one of its cross members (Figs. 2 and 8).

The electric motors themselves are clearly illustrated in Figs. 6 and 10. The motors are 6-pole series machines of 7.6 hp. output at 155 volts and about 650 r.p.m. They are enclosed water tight, and the housings are parted in the longitudinal plane, in order to facilitate the removal of the armature. An inspection door permits ready access to the carbon brushes and the commutator. The commutator and windings are built up on a sleeve, so that the armature shaft can be removed if necessary, without disturbing the armature itself.

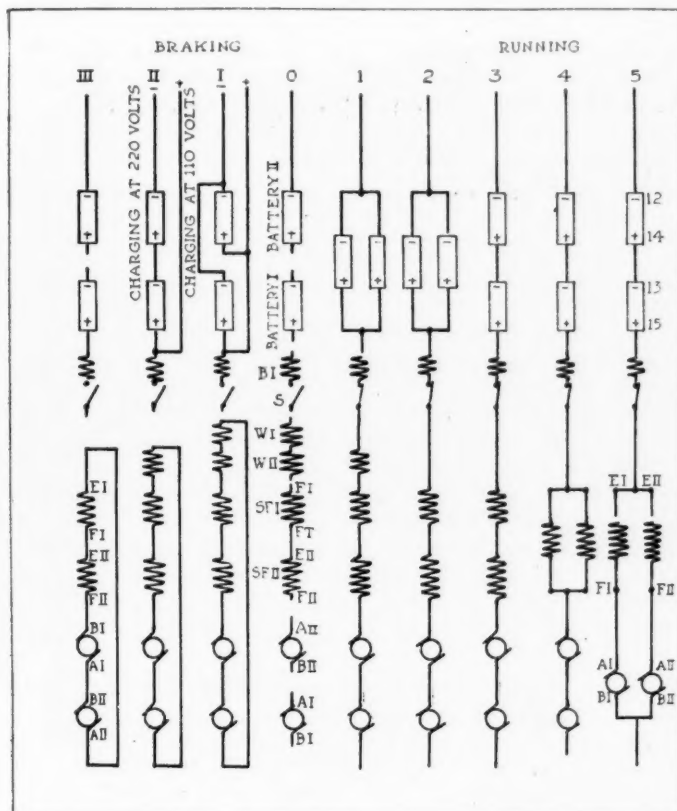
Figs. 11 and 12 show the double motor drive of the National Automobile Co., Berlin. The motors, which were manufactured by the German-General Electric Co., of which latter the National Automobile Company is a subsidiary, have an output of 5 h.p. each at 500 r.p.m. They are series wound motors with two brushes located close together. The use of two adjacent brushes of the same polarity reduces the sparking at the commutator, which is caused by the vibration of the brushes due to road shocks. The motors are so designed that they can temporarily deliver twice their rated output without injury. They are rigidly connected to the rear axle and drive the rear wheels through a completely enclosed reduction gearing. The transmission of the driving thrust from the axle to the vehicle frames in this case is accomplished through the springs themselves, which to this end are directly pivoted to the vehicle frame at their forward end, while at the rear end, long spring brackets insure the proper freedom of motion for the springs. The motors are completely enclosed; the cylindrical housing of cast steel consists of a single piece, while an easily removable cover plate gives access to the

commutator and brushes. One of the advantages of the double motor drive is that in case one motor should go out of commission on the road, the truck could return to the garage on the other motor.

In Figs. 13 and 14 are shown the control apparatuses of the two previously described truck types. In Fig. 13 (Bergmann) there may be seen at the front of the truck the 5-speed forward and reverse controller drum. The reverse speeds are obtained by reversing the direction of the current and then setting the controller for the speed desired. If the driver wants to go forward again, he first returns the controller lever to the zero position, and only after the current has been reversed can the truck be started anew in the forward direction by moving the controller lever successively to the different positions.

The controller lever is arranged at the right-hand of the driver. In addition, there is provided an emergency switch which is independent of the controller, and which can be operated with the left foot. (Figs. 1 and 2.) While the controller, the resistances, the emergency switch and reversing switch are located in front of the driver under the cowl, the fuses, the voltmeter and ammeter are mounted on the dashboard. The controller is of the drum type and is operated by means of a toothed rack from the controller lever, as may be seen from Figs. 2 and 13.

In Fig. 14 (N. A. G.) the controller, as well as the starting resistance, is mounted inside of the frame on the floor of the driver's seat. The controller box with the accessory apparatus and the measuring instruments is located at the center of the dashboard. Operation of the controller is effected by means of a control and hand lever, located on the right side of the driver's seat. The controller provides 5 forward speeds, three braking combinations and three reverse speeds. The controller is arranged for short circuit braking. Of the three braking combinations two give a soft braking effect for normal use, while the third serves to instantaneously

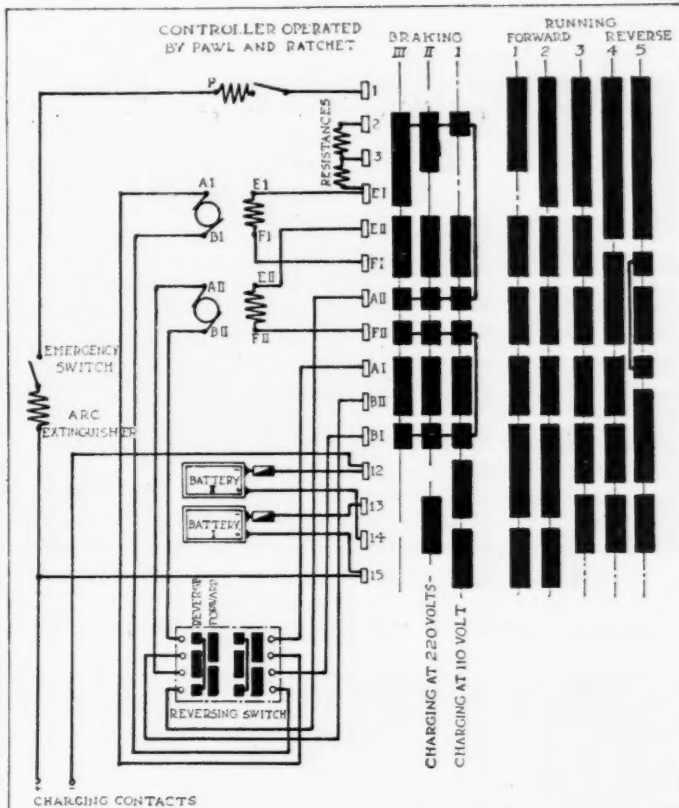
Fig. 15—Diagram of control connections
(Bergmann)

interrupt the motor current in case of a sudden emergency, by means of an interrupter drum mounted within the controller, which is brought into connection with the foot brake. By operating this brake, the motor current is simultaneously interrupted, even if the controller is not inserted. The interrupter drum returns automatically to the contact position, as soon as the main drum is returned to the zero position by the lever of the controller. The controller is also provided with a lateral lever with latch, by means of which the current is interrupted every time the controller is operated, so that the motion of the controller contact can be effected without sparking and burning of the contact fingers of the controller drum is obviated. A special arc-extinguishing device prevents sparking at the switch operated by this lever. The controller box mounted on the dashboard contains the reversing switch, safety fuses and emergency switch. When the reversing switch is in the reversing position, the two highest speed positions of the controller cannot be attained.

Figs. 15 and 16 show diagrams of connections for the Bergmann truck. From Fig. 15 the connections for the individual positions, beginning with zero, toward the right for forward motion up to the fifth position, and toward the left for the reverse motion up to the third position, may be recognized. In Fig. 16 the controller drum is shown in the developed form, and this figure also shows the individual positions for five forward and three reverse speeds.

Following are some of the chief specifications of these trucks:

Useful load	4 to 5 metric tons
Weight of the truck chassis.....	9,460 lb.
Weight of truck ready for the road.....	11,000 lb.
Height of side walls.....	32 in.
Tire dimensions, front.....	37 x 4 1/4 in. single
Tire dimensions, rear.....	37 x 4 1/4 in. double
Wheelbase	160 in.

Fig. 16—Control connections, with controller drum developed
(Bergmann)

Tread, front	60 in.
Tread, rear	68 in.
Width of chassis frame.....	30.75 in.
Height of frame from ground.....	32.5 in.
Length of body	143 in.
Width of body	72.5 in.
Total weight, loaded.....	10 metric tons
Speed	Up to 9.35 m.p.h.
Maximum grade that can be negotiated.....	7 per cent

In conclusion, it may be of interest to give a cost estimate, which, however, does not apply to present conditions, for the reason that since the end of the war there has been everywhere an increase in costs, and particularly in Germany, where, in consequence of the political conditions, and especially the continued depreciation of German currency, prices have so changed that at present three times the figures given in the estimate would have to be reckoned with.

Estimation of Operating Cost—Electric Truck

(Valid for the war year 1917)

(Cost price of truck, inclusive of battery, 40,000 marks)

1. Annual maintenance cost. (Yearly mileage, 9,300.)	Marks
a—Insurance	550
b—Interest at 5 per cent on 40,000 marks.....	2,000
c—Depreciation at 20 per cent on 40,000 marks.....	8,000
d—Maintenance	1,000
e—Garage	500
Total	12,050
2. Annual operating cost:	
f—Operator (women drivers).....	2,800
g—Tires (steel)	1,200
h—Charging current	3,600
i—Oil, grease, illumination.....	350
k—Tools, miscellaneous	200
l—Battery maintenance	6,000
Total	14,150
Plus	12,050
Grand total	26,200
Cost per mile, 2.80 marks.	

An Effective Method of Fitting and Finishing Fenders

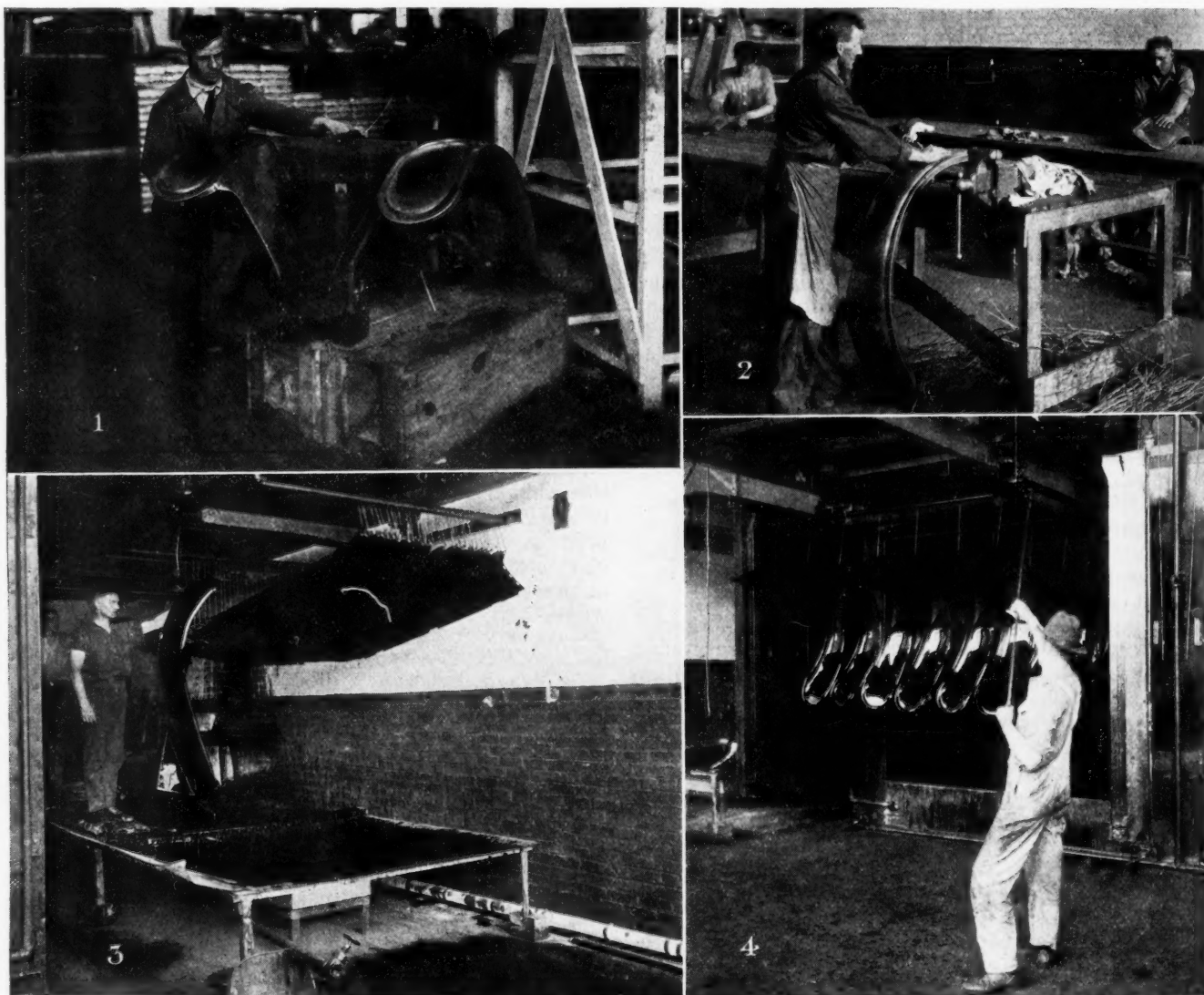
IT is important in the manufacture of fenders that a good fit be obtained before the enameling operations are started. This, of course, can best be done by the use of a jig. Such a method has proven very successful at the plant of the Liberty Motor Car Co. This department of the shop, which is devoted to the assembly of cars from standard units, is operated practically without rejections by taking elaborate care in the preparatory work as well as in the enameling.

The first operation, before the fenders are put through any of the enameling operations, is to make them accurate by means of a gage illustrated in Fig. 1, shown on the opposite page. This gage is an exact reproduction of the conditions necessary for an accurate fit on a car and furthermore, controls not only the attaching bolt holes, but

also gages the right and left fenders so that they are of exactly the same height and so that all fenders are interchangeable.

It has been the experience of car manufacturers generally that even on replacement jobs it has been necessary to do considerable bending and consequently, stressing of the fenders in fitting them to the bodies. This invariably results in squeaks after a time, and also is sure to result in rapid cracking of the enamel, since even the best enamel cannot stand up under the combined stress of bending and road vibration.

As will be noted in the illustration, the gage not only properly locates the bolt holes, but it will not permit the fenders to be either too low or too high, since there is a notch into which the edge of the fender must fit in true-



1—By means of this gage an accurate fit of the fender is assured before it goes through the enameling operations, thus there is no cracking or checking afterward because of the necessity of bending the fender in order to make it fit. 2—Sanding and polishing the fenders for the Liberty car before enameling. 3—Dipping and draining the fenders. 4—Drawing the fenders out of the ovens after baking. The temperature of the oven is maintained at 400 deg. Fahr.

ing it up in the gage. Any bending work necessary to a perfect fit is done at this time.

One man takes care of this operation and he is able to keep up with the factory output, which averages about 30 cars per day. It has been found that this method reduces the assembly time in addition to practically doing away with damage to the fender in the final assembly.

After the fender has left the cage, it is made ready for the enameling operations by a sanding and polishing operation. This is done by hand, as shown in Fig. 2, and a carefully prepared surface is presented for the enameling operation, as it has been found that this is highly essential in securing satisfaction in the latter department. Previous to the introduction of this carefully studied system, the rejections ran into considerable percentages at times, in the enameling department, while at the present time they are practically zero. The enameling is done by the dipping process, the excess enamel draining into troughs and being recovered, as illustrated in Fig. 3. The parts,

while being drained, hang on hooks from an overhead carrier which runs on overhead rails to the drying oven. After the excess enamel has been drained off, these fenders are rolled on their overhead carrier directly into the ovens and baked at a temperature of 400 deg. Fahr. The overhead carrier runs directly into the oven as shown in Fig. 4.

There is no handling or brush work. The system is mechanical throughout, and can be utilized for either small or large production. The success of the system depends on the carefulness of the operator in inspecting the work before it enters the oven and in baking at the proper temperature.

The mechanical handling of the enameled objects does away with irregularities of enameling of the surface due to contact with objects not intended. After the fenders have been withdrawn from the enameling oven, they are ready to be assembled to the car and are taken to the finished stock department at a point on the assembly line adjacent to that at which they are applied to the bodies.

Foremanship Training

THE foreman is the keystone of production. Upon him depend for success both the executive over him and the workmen under him. Because of this fact, the movement towards training foremen in such a way as to enable them to perform their tasks more effectively has received favorable attention in many organizations. Since this type of instruction is comparatively new, however, there are almost as many methods of instruction as there are courses. While no system of foremanship training can ever be devised for universal application, it is probable that certain fundamentals of practice can be developed which could be successfully used with modifications in any class.

One of the first questions which arises when the establishment of a foremanship training course is contemplated concerns the method of teaching. Up to the present time the lecture course method has been the one most generally adopted. Since this is the case, it is interesting to note the foremanship training work developed during the past two years at the Submarine Boat Corp. The men directing the training in this organization object strenuously to the lecture method, chiefly for the following reasons:

1. Most foremen are not accustomed to listening to lectures or taking notes of any kind. Consequently, the amount of material they can absorb is very limited.
2. The lecture method is not congenial to maintaining interest.
3. The primary object of foreman training is education. Education does not consist primarily in imparting information. It consists in developing the mind of the student in such a way that he can accurately think out problems and meet situations for himself. The lecture method fails to accomplish this.

Thus, believing that the popularity of the lecture method is due chiefly to the fact that it is the easiest to install and not to its utility, the men in charge of training at this plant have developed their courses along distinctly different lines. Classes are held once a week on company time, each class lasting two hours. The instructor acts rather as the leader of the discussion than as the source of all knowledge which is to be imparted. He directs the discussion along certain definite lines outlined for the course. Points of actual practice are brought up and are thoroughly discussed, each man in the class taking part in the discussion.

Far from having any difficulty in stimulating this discussion, the experience has been that it is not easy to shut off the discussion within the proscribed period. At the end of the discussion, the instructor sums up the ground which has been covered and the general conclusions which have been reached. Thus the men are given a definite idea with which to go away, although most of the class time has been taken up with a general and common discussion.

In this way the minds of the men are stimulated, they are taught to think, to solve problems for themselves, and as a result a very definitely increased interest in production has resulted.

While objections may be made to some of the methods used in this training course, a careful study of the facts shows that the work has been successful and that it has accomplished its purpose to a far greater extent than have numerous other training courses conducted along very different lines.

Autogenous Welding of Aluminum

THE difficulties encountered in welding aluminum by the oxy-acetylene process are due to the tendency of aluminum to oxidize readily. Oxide is formed even at ordinary temperatures, and the oxidation, of course, is very much increased at welding heat. This oxide gets into the joint and prevents a metallic weld. All endeavors to solve the problem of autogenous welding of aluminum have been in the direction of removing the aluminum oxides from the weld. According to an early process by Heraeus of Hanau, Germany, the oxide was pressed out of the joint at a certain temperature slightly below welding heat by hammering. This process, however, called for very skilled welders and did not insure the removal of all oxide.

Patents taken out in 1906 and 1907 provide for the removal of the aluminum oxides by means of a solvent in the form of a welding powder, and this is claimed to be a great advance over the previous process. This process is controlled by the Autogenous Aluminum Welding Company in Zurich, Switzerland, and a license for its use in Germany has been secured by the Chemical Works of Griesheim-Elektron. It is said to have been widely used in Germany during the war on account of the copper shortage.

Promoting from Within Organization Provides Incentive

Difficulty is experienced in nearly every plant in getting the rank and file of workers actively interested in accomplishing their tasks to the best of their ability. A definite policy of filling vacancies from within the organization has aided in doing this in a concern manufacturing differentials

By Norman G. Shidle

IN an address before the Taylor Society recently, Ernest Martin Hopkins, President of Dartmouth College, emphasized the necessity for providing an incentive to the industrial worker in place of the joy of artisanship eliminated by the invention of machinery. The thought has been general among industrial managers for some time, yet practical means of putting it into effect have not been easy to devise.

The policy of promoting men within the plant rather than going out and hiring foremen and executives has been found particularly effective in providing this incentive through an opportunity for the highest personal development. Such a policy has proved successful at the Brown-Lipe-Chapin Co., which employs about 1500 men. Though no definite plan has been laid down for the operation of this policy, there are a number of methods in use which tend to carry it out in an intelligent and effective manner.

Beginning with the lowest grade of worker, an opportunity for promotion is given. A four-year apprentice machinists' training course has been installed, in which are trained young men who are absolutely "green" in factory work. The "promotion-from-within" system begins to operate from the bottom in connection with this course. The boys who get the privilege of this instruction are office boys, mail carriers, helpers, etc., of various kinds who are already working at the plant in some capacity. Thus these boys are encouraged to step out of the "blind-alley" occupation and obtain knowledge to enable them to go forward to real success in later years.

During this training course, the boys are paid 35c to 40c an hour. They are taught not only the theory and practice of machine shop work, but also the company methods and policies which will fit them for future advancement, if lack of ambition and personal limitations do not hold them back.

From this course are drawn most of the machinists. The next step on the ladder of progress open to the workmen is a sub-foreman or foreman job. Such promotions are made almost entirely from among men already at work as machinists. No special mechanical system is used for marking or rating the workmen, but the foremen keep a close watch upon the general ability of a man, his attitude towards his work, and his production record. Then when an opening occurs, it is possible to make the promotion from within the ranks of the workmen.

Much faith is placed in the conference method of administration at the Brown-Lipe-Chapin plant, and this method has much to do with the success and effectiveness of the policy of making promotions from within the plant, especially to executive positions. To begin with, the

heads of departments meet frequently in an informal way at a downtown club, where they have dinner together and spend the evening discussing various phases of production and administration work. Through the medium of these conferences are brought to light the personnel needs of the different departments and the vacancies which might be filled by certain promising men in the factory.

The qualifications of any particular man can be discussed and the place chosen in which he is likely to make good to the best advantage. In this way every opportunity is given to the ambitious man to get ahead; no workman or foreman has cause to feel that he has nothing before him except a continual round of the same duties without advancement until he dies.

The conference idea is pursued as well in an administrative way. When any problem of operation comes up, the heads of the departments concerned meet together with the foremen of the sections immediately involved. At this conference the matter under consideration is thoroughly thrashed out and discussed. Then the decision is made according to the will of the majority. By means of these conferences, not only are problems of administration and operation being decided, but the foremen are gaining an education in methods, reasons and procedure that would be impossible for them to acquire by any other means.

Classes for foremen are held, as well, which deal with the various phases of a foreman's work, the subjects ranging all the way from mechanical set-up and regulation of machines to the handling of men. The educational director in charge of these classes keeps close watch upon the ability of the various men in them, so that he can act in an advisory capacity when the matter of promotion comes up.

By these two means, foremen are brought to such a state of development that when vacancies do occur in the executive ranks, men who are familiar with every phase of the work can readily be advanced from within the organization.

Thus a definite policy of advancing men within the organization to the limit of their individual ability and ambition removes the irritating lid which so often holds down a man's ambition, makes him discontented with his work, and restless in performing it.

Coupled with this definite means of reducing unrest and making the organization more efficient is the general policy of getting work from men by showing them "why", instead of through the mere exercise of authority; or, as aptly put by John Adendorff, the Brown-Lipe-Chapin factory manager, "through winning men rather than through driving them." Mr. Adendorff expressed the opinion that

merely from the point of view of getting production and efficient work, the use of force was ineffective. "You can compel one man by weight of authority to do something," he said. "You can force two men, and perhaps three or more, according to the size of your force. But if men do things merely because they have to—not understanding why—the psychological reaction is inevitably one of opposition. Thus the more men you force the greater becomes the reacting force of opposition. Such a policy can be successful only for a limited length of time. Look at the Kaiser. He tried it and the bag finally burst. It is bound to be like that in every case. The only successful way is to win men, not to drive them. That doesn't mean pampering them or using soft words. It simply means putting all the cards on the table, explaining reasons, and showing them why they are to do certain things."

There are many other things in this plant that enter into the matter of keeping men contented with their work and at their highest productive level, but the opportunity given for personal development within the plant itself through this promotion policy is one of the chief factors. During 1919, a year of unusual industrial unrest in this country, the labor turnover was about 105 per cent, a good record when the various difficulties are considered and when the figures are compared with those of some plants in other industrial centers. Two features of the promotion policy are of special importance: first, the means for judging men and making promotions from within are present; and, second, various ways, both formal and informal, are used to teach men those things which will make them capable of filling some position to which they may be promoted.

Giving Attention to Labor

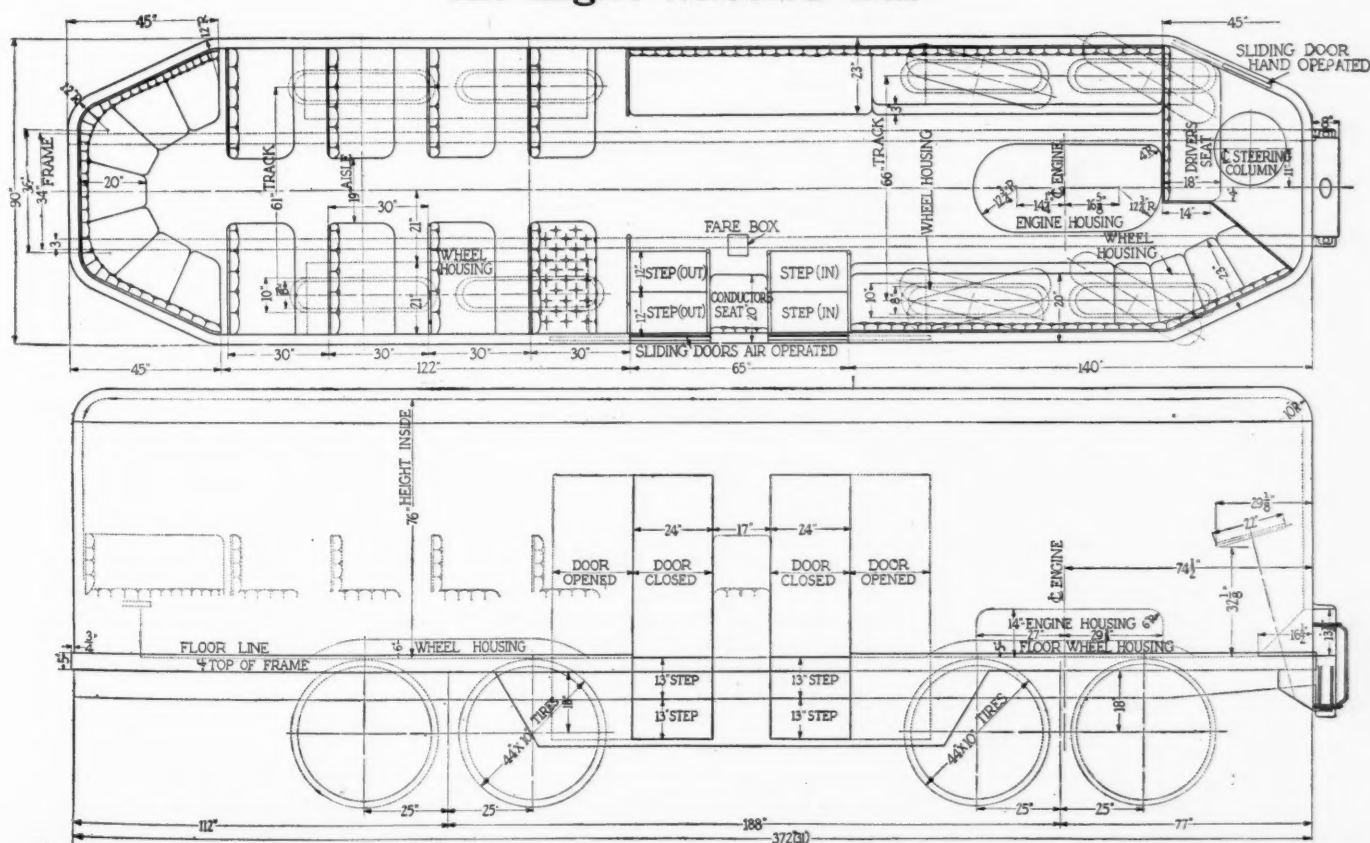
"THE real significance of scientific management is not yet understood by the general business public," said J. William Schulze of the J. William Schulze Co. recently. "The underlying philosophy—the simple principle of addressing scientifically all problems of business—seems not to have been grasped in any general way by the administrative officials in our business enterprises."

While the above statement may be true to a greater or less extent of the attitude toward any one of the various departments of a modern industrial organization, it is probably more true of the type of attention given to labor policy and administration than any other. Many executives who always approach their financial and production problems from a scientific and an analytical

point of view are prone sometimes to make their decisions concerning personnel work during a luncheon conversation or over a cigar at the club.

Even when definite and thoughtful consideration is given to this phase of the work, there is often lacking a correlated and collected information with which to guide that thought and upon which to base an intelligent opinion. The labor problem is, of course, harder to analyze than any other because of the greater number of variables and abstract factors entering into it. Each day, however, further study and investigation helps to reduce the number of indefinite factors; and scientific investigations and analysis indicate the safest and most effective roads to the solution of our industrial problems.

An Eight-Wheeled Bus



The plans shown herewith are for a bus with center doors. They were provided for the Goodyear Tire & Rubber Co.

Accurate Stock Records Maintain Plant Efficiency

The factory which has a stock-keeping system which will indicate at any time the exact amount of a given material on hand has a distinct advantage. The perpetual inventory system described in this article is used in a service station, but is adaptable to factory methods as well.

THE factory with a stock-keeping system which will indicate at any time the exact amount of a given material on hand has a distinct advantage over others where less accurate methods prevail. The perpetual inventory system described in this article is used in a service station, but is adaptable to factory methods.

Methods of receiving, requisitioning and disbursing stock differ somewhat in various plants, while the task of keeping a perpetual inventory of goods seems to be as difficult as it is desirable. An investigation of methods in use at other plants is likely to reveal details of practice suitable for adoption in any specific organization.

Although the system described in this article is in use at a large service station, the receiving and recording of parts is similar to the same process in the factory, the only difference being that, where the service station orders from the factory, the factory would order from outside agencies. There is, too, this difference: the service stations have none of those difficulties of ordering which confront the factory. The former merely orders from the factory; the latter must order throughout a wide and fluctuating market. This article, however, covers only the matter of records and requisitions, it does not attempt in any way to treat the problems of ordering.

The description of seven forms will explain in detail the general scheme of operation in use at the Pierce-Arrow service station at Long Island City. Since the process of ordering, receiving, disbursing, etc., constitutes a complete circle, it is possible to begin the explanation at almost any point, the best perhaps being the origin of the order for materials.

Each unit of stock has a minimum and a maximum number of pieces. The number of pieces in stock should be somewhere between these two figures. The stock record cards which record the stock received and disbursed are filed in such a way that a red tag or signal can be placed on top of any card by a file clerk when the stock has reached a minimum and needs replenishment. These red tags furnish the chief source from which orders originate. Stock men daily go through these files, picking out the cards marked with the signal tag. From the results of this daily investigation, additional stock is ordered.

Orders may also originate from the "Shortage Ticket," shown in Fig. 1. This ticket is used to record orders for specific or special parts, either from within the shop or from an outside customer. If, for instance, a special part is needed, which is not ordinarily kept in stock, the order is placed on the "Shortage Ticket."

The image displays three forms used in the Pierce-Arrow stock-keeping system:

- Form 1: SHORTAGE TICKET** (Form 41 984-B-15). This form is used to record orders for specific or special parts. It includes fields for NAME, ADDRESS, CAR NO., INSTRUCTIONS, ORDERED BY, and a table for recording parts ordered and disbursements. It also has checkboxes for Telegram, Regular, and Received.
- Form 2: STOCK RECORD CARD** (Form 41 984-B-16). This is a key-record card for tracking stock. It includes fields for DESCRIPTION, MAX, MIN, and a large table for recording parts ordered and disbursements.
- Form 3: STOCK BALANCE SHEET** (Form 41 984-B-17). This form is used daily to check stock record card entries against a physical inventory. It includes fields for CLERK, DATE, and a table for recording stock balance.

1—Shortage ticket, through which special orders originate. 2—Stock record card, the key-record of this system. 3—Stock balance sheets used daily, on which stock record card entries are checked against a physical inventory

[illegible]

4—"Over" sheet on which are listed number of parts shown by physical inventory in excess of stock card records. Similar to "Under" sheet. 5—Factory order, on which parts are ordered from factory. 6—Stock requisition. 7—Packing slip which accompanies shipments from factories, and serves as receiving slip at service station.

The key-record is really the stock record card, Fig. 2. A separate card is used for recording the various transactions in regard to each unit or item. This card is divided into two parts, on one of which is listed the material received and on the other the quantity disbursed. Reference to the figure will illustrate the operation of the system. When an order for parts is sent to the factory, the date, order number and quantity ordered is recorded in the proper columns under the "Parts Ordered" section. When the parts ordered are received from the factory, the quantity received and the date also are listed under the proper columns. The quantity received figures do not, of course, always correspond exactly to the quantity ordered figures, since a lack of supply, a mistake, or some other unforeseen circumstance may serve to make a difference.

On the right hand side of the record card are listed all disbursements from stock. The date, the number of the requisition upon which the stock was disbursed and the quantity disbursed are recorded in the columns so designated. Following the "Quantity" column, in the "Disbursements" section, a column headed "Balance" appears. This column is filled in with the figures obtained by subtracting the total units recorded under "Quantity Dis-

bursed" from the total units recorded under "Quantity Received." Thus, the last figures in the "Balance" column always indicate the exact amount of that particular stock on hand in the stock-room.

At the top of each card is noted the maximum and minimum for the particular stock unit to be recorded on that card. By comparing these figures with those appearing under the "Balance" column, the stock man, in going through the red tagged cards each day, may determine at a glance the amount of material which must be ordered to bring up the particular unit to its required maximum. He does not, however, order on the basis of this calculation alone.

At the time the stock clerk makes his daily check of the stock cards, he notes the results of his investigation of each card on the "Stock Balance Sheet," illustrated in Fig. 3. To begin with, he enters the description of the article, the quantity supposed to be in stock as indicated by the stock card figures and the maximum and minimum. He then goes to the stock room and actually takes a physical inventory of the particular item, recording the results of his count in the column headed "In Stock." The factory order is then made up on the basis of the difference between the actual count and the pre-

scribed maximum or minimum. If there is a difference between the actual number of pieces in stock and the number shown on the stock record card, this difference is listed on an "Over" or "Under" sheet. An "Over" sheet is shown in Fig. 4. It simply has listed on it the difference between the actual count and the count on the stock record card. From the "Over" or "Under" sheet any necessary correction is made at once on the stock record card to show actual balance.

Thus, it is evident, a constant and continuous process of inventorying is carried on. The stock record cards indicate at any given time very closely the actual number of pieces in stock; in fact, only very slight variations are ever found between the card records and the actual count. This is due chiefly to the fact that the stock record cards are kept absolutely up-to-date, are followed very carefully and constantly and are not allowed to become confused by lack of attention for even one day. By such careful methods, it has been found possible to keep the majority of records so accurately that the physical count corresponds exactly to the stock card record. A survey of a number of stock record cards chosen at random shows that it has been necessary to make only a few adjustments to conform with the results of the physical inventory.

A physical inventory of each stock item is taken when it reaches or goes below its prescribed minimum. This has several advantages.

1. It makes inventory continuous and never necessitates a shutdown to take an inventory.
2. It enables the inventory to be taken on each item at the time when the stock is lowest and, hence, easiest to count.
3. At all other times the stock record cards provide an accurate check on the amount of parts in stock.

The two forms which precede and follow in sequence the stock record card are the "Factory Order," Fig. 5, and the "Stock Requisition," Fig. 6, respectively. There is nothing especially distinctive about these forms, but they are presented to show clearly the entire sequence of the process carried out by this firm.

A carbon copy of the factory order is preserved in the local office. When an order comes from the factory, it bears with it a packing slip, similar to the one shown in Fig. 7. This serves as the factory packing slip and the service station receiving slip. Upon arrival this slip is stamped with the date of arrival, the service station file number, and its receiving slip (D D) number. When the invoice arrives, it is checked against the copy of the factory order and the quantities received are then entered on the stock record card, as previously described.

Besides the stock requisition illustrated here, two other forms of requisitions may be used to get stock out under special circumstances. Since these special conditions, however, pertain rather to a service station than to a general factory stock system, they are not described here in detail.

It has been found possible by this method of stock keeping to raise that department to a high standard of efficiency at a minimum of labor and expense. The point to be emphasized in any system of perpetual inventory is the absolute necessity of "keeping after it" day in and day out, seeing that it is absolutely up to date and that the system is never allowed to lag. This phase of its operation is far more important than any other and neglect of it has been the downfall of more than one department which has attempted to use some such plan.

New Series Lighting and Generating Set

ILLUSTRATIONS are shown herewith of the new Bosch generator, starter and instrument board unit, which products were referred to in the news columns of a recent issue. The generator, which is of cylindrical form, is made in two sizes, 4 and 5 in. in diameter, respectively. Regulation is by the third brush system and the generators are wound for either 6 or 12 volt operation. Among the claims made are low cut-in speed and rapid rise to full voltage. Both sizes of generators are of 4-pole construction. The armature and other windings are impregnated to insure thorough insulation. The cut-out relay and field fuse are mounted on top of the generator and are therefore readily accessible. Some of the features of generator construction are pressed steel frames, drop-

forged pole shoes and ball bearings. Any of the various S. A. E. mountings and the standard S. A. E. shaft end are furnished.

The starting motors are also made in two sizes, of 4 and 5 in. diameter respectively. They, too, are 4-pole and wound for either 6 or 12 volts. All starting motors are fitted with the Bendix drive, for either inboard or outboard mounting, and oil-less bushings are used. Either the cradle or flange mounting is used. The starting switch is of the foot button type and is bolted to the foot board.

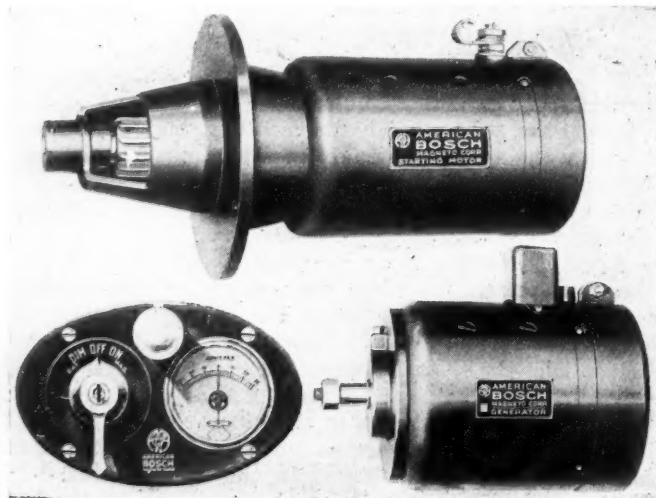
The lighting and ignition switch is mounted on an oval frame with the ammeter and dash light. The finish is black enamel with nickel trimmings. The switch controls the ignition and lighting systems and is provided with a key for locking. The ammeter is a standard Weston.

The Automobile In Smyrna

THE motor car and truck has had its introduction into Smyrna, Turkey, within the last six or eight months, according to letters received in New York from business interests there. But since that time, Chevrolet, Buick, Ford, Overland, Fiat and two or three English cars have made their appearance. One model of a single-ton truck also has been seen, but roads were said to be so poor that, except in the Smyrna district, heavy truck traffic would be doubtful.

The American Commission for Relief in the Near East brought some ten or twelve Case tractors to the district last year. No others had been imported. The selling season for such equipment was fixed as June and July.

Gasoline was reported as selling at 90 cents per gallon, with kerosene at about 50 cents. Three garages are being operated in Smyrna and there are a number of so-called "automobile dealers," it was said.



The new Bosch starting and lighting system

The Growing Automotive Markets of Central America

The six countries of Panama, Costa Rica, Guatemala, Honduras, Nicaragua and Salvador form an outlet for export sales that should always be dominated by the American builders. Potential markets, as well as an analysis of the conditions that surround selling into this district, are given here.

CENTRAL AMERICA, which presents an automotive market that should always be dominated and held practically exclusively by the manufacturers of the United States, is becoming of greater importance each year, despite numerous and rather obvious handicaps that serve to limit its purchases. With yearly imports of automobiles and automotive equipment that total, as they did in the fiscal year 1919, some \$1,523,036, the six countries of Costa Rica, Guatemala, Honduras, Nicaragua, Panama and Salvador make up an outlet that should receive the attention of the exporter of the United States.

As in other foreign countries, especially those outside of Europe, sales into Central America of motor cars and trucks are low because of the lack of good roads, because of the heavy percentage of Indians and natives in the population and because of the generally limited commerce of the various republics. However, it appears that roads are being built and improved in many parts of the Central American section and that the seeds of future construction and expansion have been sown. The result, perhaps, will be the motorization of the various countries to a much greater extent during the coming years and the promise, at least, is of such interest that these markets demand watching.

Panama, which has the Canal Zone as its most important buying factor, is the largest purchaser of cars and equipment in Central America, taking about half of the total shipments to the six countries. This is due, of course, to the great number of army officers and civilian workers of the Canal Zone, who make up the heaviest buying group of any in the territories under review. Following Panama, in the purchase of cars and equipment, come Salvador and Guatemala, as second and third, each of which took approximately one-sixth of the Central American shipments in 1919. Fourth place goes to Nicaragua, with Honduras as the fifth and Costa Rica as the sixth and smallest purchaser of those countries under review here.

Roads the Greatest Drawback

Conditions vary to a certain extent in each of the sections but any careful study of the district as a whole will reveal that the mileage of good roads, or of roads of such construction as to permit passage of cars and trucks, is surprisingly small. That includes even the Canal Zone, in which the registration of automobiles in February, 1920, amounted to 1401. But the Pacific end of the Canal district, including the Sabanas district and the city of Panama, has, it is declared, no more than 86.3 miles of roads suitable for automobile traffic while the Atlantic end, embracing rural roads and streets of the cities of

Colon and Cristobal, is limited to some 20 miles. The third district, possessing good highways, which includes the villages of Culebra, Empire and Las Cascades, boasts of some 18 miles. However, extensions of the concrete roads of the Canal Zone itself are being carried out and bridges throughout the section are built of concrete to carry the heaviest transportation. The Republic of Panama, it is said, is doing nothing to promote road construction.

A Résumé of Conditions

The Bureau of Foreign and Domestic Commerce has just published a comprehensive résumé of automotive conditions and markets within the Central American district, the subject matter consisting of reports from its representatives in each of the different cities and towns in the six countries. Altogether it forms a careful analysis of conditions as they existed shortly before the time of publication and should be studied by the exporter who considers introducing his product into that tropical territory.

Salvador, the second heaviest purchasing country, has the smallest area of any of the Central American republics but it seems to be alive to the necessity of developing its roads, the reason being assigned to the automobile. It has nominally several thousands of highways, but something like 100 are of good dirt construction and about 35 miles are macadamized. Most of the Salvadorean towns, similar to many of the larger towns of the six countries, have cobble stone streets. The better roads radiate from the capital, a macadam drive connecting San Salvador with the suburbs of Santa Tecla, some 7 miles, and Cohutepique, some 5 miles. Motor service is maintained between several places radiating from San Salvador, the longest being the 23-mile stretch, now being completed, to La Libertad. This roadway, the grade of which rises to 2000 ft. above sea level, is described as being of the best type of macadam construction.

"Few roads in Salvador are passable for touring cars, and the roads for cars equipped with pneumatic tires are prohibited to vehicles using solid tires," says Vice-Consul Lawrence M. Sack of San Salvador. "Trucks for use here would have to be small, not over $\frac{3}{4}$ -ton, and should be equipped with pneumatic tires. It would also be well to equip cars for use here with an extra large radiator or an auxiliary water tank. Transmission should operate in oil, since cars must encounter hills ranging from 12 to 30 per cent grade and from 1 to 3 miles long."

Eleven motor trucks were imported into Salvador during the four years ending 1919. Since 1913, the yearly average purchase of passenger cars has been 44, having an average value of \$1,030, but the year 1919 saw this number

practically doubled, the value rising to \$1,453. Tire importations that year rose to \$95,664, with parts at \$43,915, and the 18 motorcycles reached a valuation of \$5,849, the automotive total being \$279,321.

Of the cars in Panama, something more than one-third are used for official purposes, while the remainder are divided almost equally between taxicab and private use. The bureau reports that cars of all classes are in service there, as follows:

Demand for Medium Priced Cars

"All of the well-known American cars are seen here, many manufacturers of the United States being represented by local agents. The general demand, which seems likely to continue, is for medium-priced cars selling at \$750 to \$1,500 each. The car most in evidence is the four-cylinder, five-passenger car, although a few high-priced six and eight-cylinder, seven-passenger cars have been imported in recent years. A good many roadsters are used, a few of which are six and eight-cylinder. A number of small delivery cars and trucks are used by business houses and individuals in Panama City. The Department of Fomento has motor trucks. The police and fire departments have motor cars of various kinds in service. Large motor buses are used in the official service of the Canal Zone and the police, commissary, and medical branches operate a number of cars. The past two years have seen a large increase in the number of cars and trucks used by the military authorities. In addition, there are numerous motorcycles, half of which are in official use."

Guatemala, the third automotive country, has some 250 cars, 10 trucks and probably 50 motorcycles. In Guatemala City alone there are 75 cars but, as the report states:

"The poor condition of roads and streets in Guatemala offers the principal drawback to the use of automobiles. Even in Guatemala City itself not more than 100 yards at a stretch are available where a speed of 12 m.p.h. can be maintained. The country roads, especially in the rainy season, are absolutely impassable for anything but mules. The consequence is that only the most strongly built cars can hope to maintain a life of more than a few months. A considerable number of the cars imported are now out of commission."

"In general, the market for motor trucks in Guatemala is not promising and there are only a few trucks in the whole republic. The best market for them would naturally be in the capital city, but officials object to the use of trucks within the city limits, alleging that the heavy vehicles would ruin the streets, the water pipes being laid near the surface. Two commercial trucks are now used in the city, and it is understood that the Government has recently imported three more with trailers to be used in the removal of debris resulting from the earthquake in

1917. If the use of these trucks proves that the fears for the safety of the streets are groundless, a market may be developed in the future."

Honduras, although motor cars are duty free, has not presented a heavy market, the 1919 totals for automobiles and equipment being \$80,000. Licenses in the Tegucigalpa district have been issued for 90 cars, but it was stated that only 60 or 70, including five trucks, are in use there. "At first, the majority of cars imported were five-passenger models, but the tendency now is for a higher-priced car seating seven. As gasoline is very high, riding for pleasure is confined to the wealthy."

Tractors have few possibilities in this region, it was said, "as it is not customary to plow or to use agricultural machinery of any kind." Prospects for enlarging the cane sugar industry in the Puerto Cortes district, however, may improve the prospects for heavier use of trucks.

Costa Rica, likewise, has few roads, although an appropriation of 300,000 colones—each of a normal value of 46.53 cents—was recently made for road building. Most of the cars are found in San Jose, which has a population of 35,000. Some 25 or 30 taxicabs are in service and nine motor trucks are operated in the city. The use of oxcarts, it is said, limits the truck market.

Costa Rica Needs Tractors

"There are possibly half a dozen tractors now in Costa Rica, one of which, a caterpillar tractor, has been in use for some time," the report states. "Recently one caterpillar and one plain tractor were brought here for demonstration purposes and agents advise that they have orders for 20 to 25 already (March 8, 1920), but only two of these have been delivered. The caterpillar type meets the requirements best, owing to the bad conditions of the roads during the rainy season, which in this section lasts about eight months of the year."

Throughout the Central American region there are a number of motor cars used on the railroads. This is a frequent use, both for cars and trucks, because of the double reason of poor roads and lack of railroad equipment.

Gasoline prices are high throughout the district. In Costa Rica, it was given as being about 80 cents per gallon. In Panama, a recent quotation was stated to be 42½ cents per gallon.

Customs duties are principally figured on the weight. In Honduras cars are admitted free. In Salvador, the duty on cars, trucks, motorcycles, and parts are \$2.29 per 100 lb. and \$13.81 on tires. In Nicaragua, the duty on everything except tires is figured at 5.625 per cent of the value, but on tires it is \$30.62 per 100 lb., net weight. The rate in Guatemala is \$4.66 per 100 lb. on cars and trucks and \$7 on motorcycles and tires. The Costa Rican rate on cars, parts and motorcycles is \$4.22 per 100 lb., while the rate on trucks is \$1.27 per 100 lb.

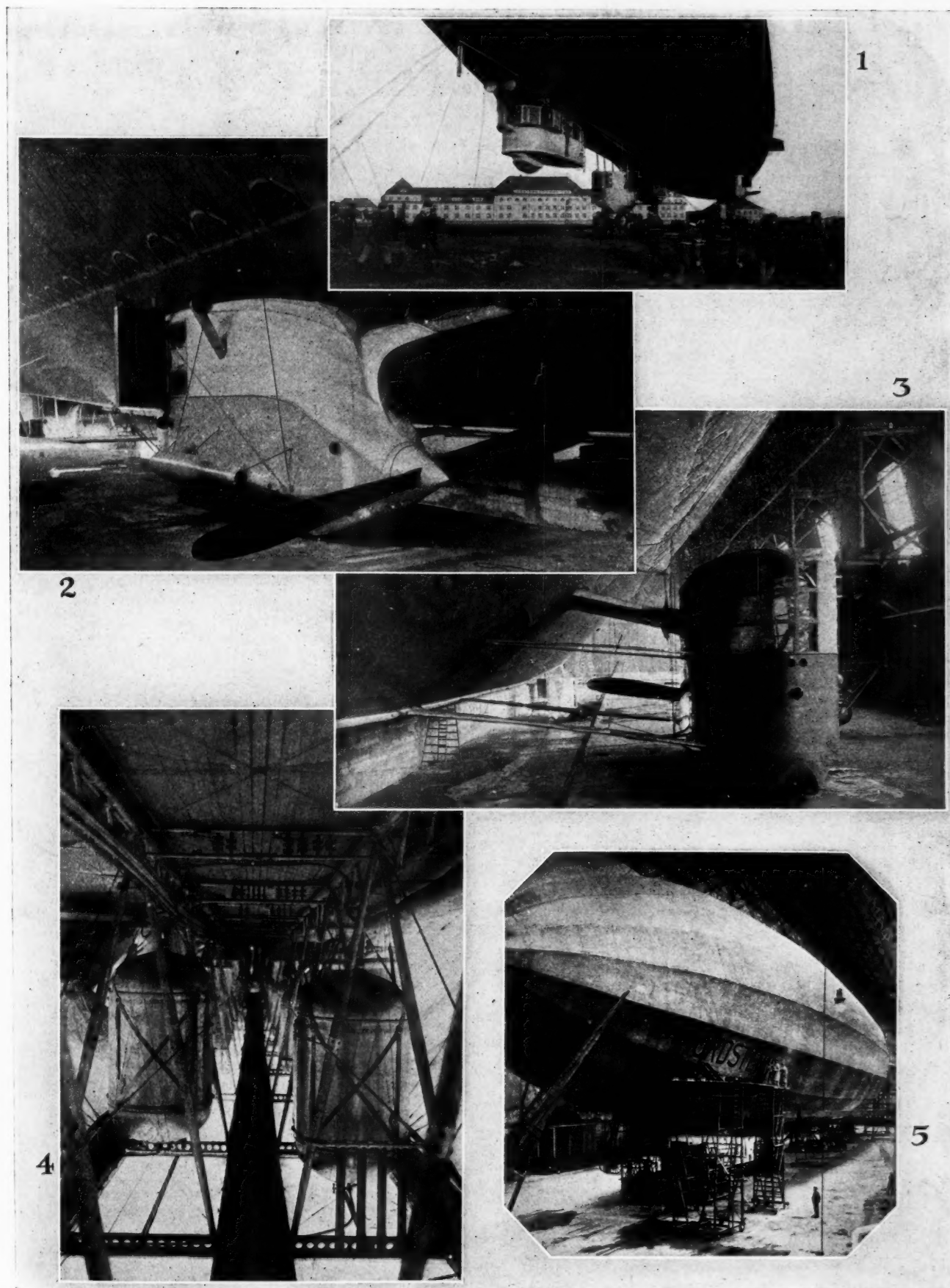
Motor Vehicles in Sao Paulo

ACCORDING to an official Brazilian announcement, referred to in the *Board of Trade Journal*, 2799 motor vehicles were registered with the police of that province up to Jan. 27 last. Of these about 140 were commercial cars and the rest passenger vehicles. This official communication further states that an early increase is anticipated, as the Ford interests alone are importing 500 cars per month into Brazil. By an anomaly of the import dues it is more advantageous to import cars via Santos than via Rio de Janeiro. The Ford cars are consequently assembled at Santos and shipped to Rio by train, the selling

price there being correspondingly higher to cover the extra freight. By far the greater number of cars running in Sao Paulo, at least of the newer ones, are of American make, and the British consul in the city is of the opinion that it will be many years to come before the British-made cars can gain the foothold held at present by American-built cars.

The following are the prices of the principal American cars being sold on the Sao Paulo market (\$1 = 4 milreis): Ford, standard make, \$900; Chevrolet, \$1,250; Dort, \$1,500; Buick, about \$2,000.

German Airship Construction



These views, just brought to this country from Europe, show two of the more successful German dirigibles—the Nordstern, a sister ship of the Bodensee, which will be used for commercial passenger work, and the Parseval PL-27, the largest semi-rigid airship built by the Germans. The arrangement and construction of the control, cars and power units closely resembles the Zeppelin. The Parseval ships were unknown to the Allies during the war, and it is believed that the Germans have abandoned the type. 1—PL-27 landing. 2—Rear view of a side gondola. 3—Front view of same. 4—Interior of keel, showing fuel tanks. 5—The Nordstern receiving the finishing touches

The Light Motor Truck Is Popular With Farmers

A recent analysis of the agricultural market for trucks indicates that trucks rated at two tons or less are preferred for farm transportation purposes. Calculations based on answers to a questionnaire show a market for 800,000 motor trucks in rural communities, few of a large size.

THE market for passenger cars among the farmers was analyzed some time ago in AUTOMOTIVE INDUSTRIES. That analysis showed in specific figures the greatly increased buying power of the farmer during recent years, his vital interest in motor transportation, and the possibility of a large number of passenger car sales in rural communities.

A similar analysis of the agricultural market for trucks, recently prepared from a questionnaire sent out from the Goodyear Tire & Rubber Co., reveals a number of valuable and interesting statistics.

The survey covers about 5000 farmers, representing agricultural activity of every type, including grain farming, live stock raising, general farming, dairying, cotton raising, fruit growing, etc. The entire country was included in the survey, so that the results are of general, as well as of sectional, interest. A conservative estimate assumes that these 5000 replies are typical of and represent at least 2,000,000 of the total of 6,700,000 farmers in the country.

Forty-four per cent of the farmers replying indicated that they had considered buying a truck, while analysis of the answers to this question in detail shows that a greater percentage of those on large farms are considering the purchase of a truck than on small farms. On the basis assumed above, this shows a farmer market for approximately 800,000 trucks.

In answer to the question, "Is a truck practicable?" 58 per cent replied "Yes" and 42 per cent "No." On the other hand, it was discovered that 17 per cent of those who did not believe a truck practicable were tractor owners, and, consequently, interested in motor power for transportation and farm work.

A feature of great importance to the sales manager interested in the farm market is the size of truck likely to be preferred by his prospects. The answers to the questionnaire bring out some interesting data on this point. In the first place, they show the rather natural fact that as the size of the farm goes up the percentage of those preferring a slightly heavier truck rises as well. On the other hand, this rise is not as marked as might be supposed. The figures are as follows:

Size of Truck Preferred by Prospect	Ton.	Under 100 Acres		101-160		161-240		Over 240 Acres	
		Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
}	Under 1	4	3	2	1				
	1	41	31	28	22				
	1½	23	30	31	28				
	2	26	29	32	39				
	Over 2	6	7	7	10				

The striking point of the figures is the apparently small demand for heavy trucks on even the larger farms. The percentage of those desiring anything larger than a 2-ton truck is very small. Even on the farms of more than 240 acres, 90 per cent of the demand is for 2-ton or smaller trucks. At the other end of the scale, the very small truck is in even greater disfavor than the large one, only 4 per cent of those on the smallest farms preferring this type.

On farms up to 160 acres, the 1-ton truck seems to have a slight preference, with the 2-ton truck taking the lead on farms larger than 160 acres. In the case of the 1, 1½, and 2-ton trucks, however, the percentages are close for nearly every type farm. The chief conclusion which may be drawn is that these three types are overwhelmingly preferred in general by those who do not now own trucks, but who are prospective buyers.

In this connection, the question arises as to the type which will be bought next time by those already owning trucks. The analysis shows that there is marked popularity for the 1, 1½ and 2-ton truck at the present time; that is, these three types predominate among the farm trucks now in use. What will be bought the next time? The accompanying chart will aid in predicting.

An analysis of the figures confirms the popularity of the 1, 1½ and 2-ton truck in a general way. A tendency is shown in every class to buy the same size truck next time, with a slight tendency, perhaps, to purchase a slightly heavier one. This general rule does not apply in the case of the less than 1-ton trucks, as a greater percentage of owners of such trucks evinced a desire to move into the 1-ton class than to buy another truck of less than 1-ton size.

Numerous advantages to the farmer through the use of a truck were revealed. Seventy-seven per cent of those

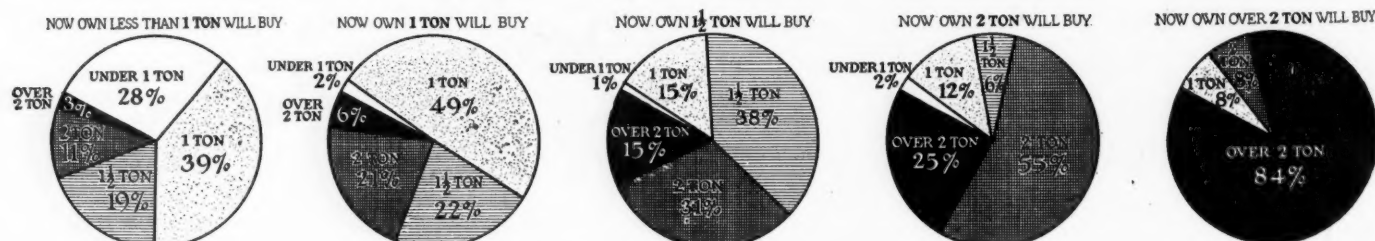


Chart showing prospective demands for motor trucks

answering the questionnaire said that it enabled them to use markets for their products which would otherwise have been unavailable; 77 per cent bore witness that the use of a truck bettered the condition of the load when it reached the market; 75 per cent said that its use reduced shrinkage, while 69 per cent were able to get a better price for their goods.

The answers to these questions concerning the advantages of truck-using indicate a rather thorough appreciation of the usefulness of truck transportation among those farmers who already own such vehicles. With something like 800,000 farmers forming a potential market for immediate truck sales, and with such a large number already "sold" on the truck transportation idea, the possibilities of this market appear to be very great.

Perhaps the hard-working truck sales manager, who reads of the wonderful possibilities of the farmer market, will ask, "Well, then, why don't they buy them?" The questionnaire asked the farmers this same question. The answers were recorded as follows:

	Per Cent.
Farm too small.....	2
Too near market.....	3
Not enough hauling to do.....	9
Bad roads.....	11
Financial.....	33

The large percentage of those who give financial reasons for their inability to buy trucks might seem to belie previous statements concerning the greatly increased prosperity of the farmer. But the following figures also came in:

Of those who gave "financial" as a reason

62 per cent own passenger cars
18 per cent own tractors

In other words, they have already paid out money for investment in some phase of motor power, but are not yet sold on the fact that it is applicable to the transportation of their crops. They are interested in and familiar with motor power as a working agency; they merely need to be convinced that motor power can make money for them as a mover of crops. Moreover, it is a common human characteristic to say "I haven't the money" as the easiest way of ending a sales discussion. Once the farmer is sold on the idea of the truck as a means of transportation, the financial trouble is likely to assume less troublesome proportions. On the other hand, it is well to bear in mind that there is no profit in selling to those individuals who actually have no money and little prospect of getting any; long term sales are not conducive to a healthy condition in truck selling.

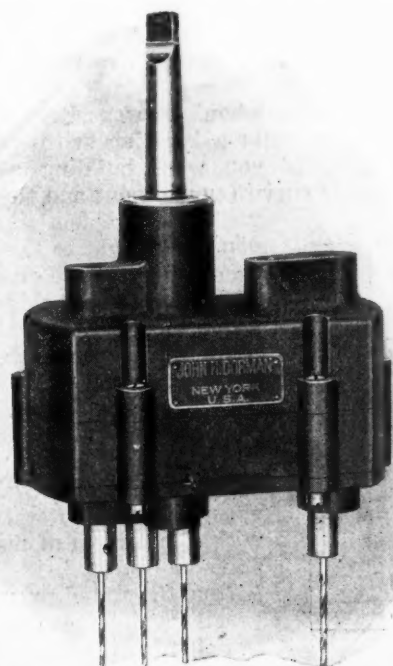
Multi-Spindle Drill Heads and Tappers

MANY manufacturers have felt the need for a multiple spindle drill press without considering it great enough to warrant the purchase of the machine. On the other hand, there are many multiple spindle jobs large enough to allow the use of a special tool for the job if available. As nearly everything that is manufactured now can be made a production job there are many occasions for the use of such special tools.

Both of these groups are catered to by the Dorman multiple spindle tapping attachments and drill heads. These are special tools for each job. They are made to tap and drill in circles and straight or irregular lines with fixed centers, which assures rigidity. The spindle holes in these attachments are bored in a universal mill-

ing machine and line up well with the work and jigs. When adjusting the spindles on multiple spindle machines by eye it is very difficult to avoid rubbing of the drill on the side of the bushing and the wobbling of the joints.

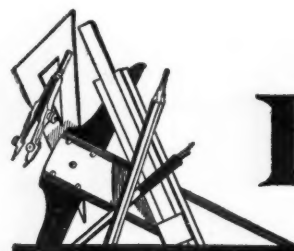
These attachments consist of a hard aluminum case containing the necessary gears. The taper shank is on the top and the spindles are on the bottom. Where necessary a clamp is provided for attachment in addition to the taper shank to secure rigidity. The bushings are of cast iron or bronze and the gears of crucible machinery steel.



The Dorman multi-spindle drill head

A COMPREHENSIVE review, compiled as a ready trade reference of the American foreign trade, has just been published by the *American Exporter*, of New York, under the title of the "Exporter's Gazetteer of Foreign Markets." The book was compiled by Lloyd R. Morris and embraces all of the countries of the world with which our firms have trade relations. It is for both the exporter and the importer and provides information concerning shipping, banking, productions, climate, local conditions, volume, value, and other similar details of trading. The volume is filled with maps, statistical tables and other information to such an extent that it should form a valuable addition to the working library of any exporter or importer.

THE Motor Traders' Association of New South Wales has announced that there will be maintained in the Association rooms a trade and technical library for the benefit of the more than 1000 dealers in that territory. Manufacturers of vehicles and component parts in America are invited to send to that association catalogues, data sheets and other publications that they care to have available for these dealers. Literature received will be bulletined to members in the journal of the Association and will be available for reference at all times. The address of the Association is Challis House, Martin Place, Sydney, N. S. W. N. Kingsley Strack is general secretary.



The FORUM



A Critique of Present Day Pneumatics

Editor AUTOMOTIVE INDUSTRIES:

THE various discussions in regard to the possible adaptability of large pneumatic tires for motor trucks, carrying heavy loads, brings out the inherent defects of the round pneumatic tire as now constructed and seems to demonstrate that the principle of construction as embodied in the tire itself is wrong and as now made the fundamental idea (resiliency) for which the tire is desired is in effect defeated, because in order to overcome the mechanical defects of construction in attempting to combine fabrics or cord with rubber in order to prevent the materials by bending, etc., from destroying themselves by heating or rim cutting or other injury, it becomes necessary to pump the tires to such a high pressure that the main object is defeated.

Any pressure in excess of that absolutely necessary to carry the weight tends to defeat the prime object of the pneumatic tire and to destroy the tire by over-straining its fabric; it prevents easy riding, as the pneumatic tire in effect approaches the action of the solid or cushion tire.

Easy riding can only be obtained by reducing the air pressure to a minimum, which causes the wheel to remain continuously on the ground and "pussyfoot" over the road, so to speak, instead of constantly "flying in air" as is the case with the present pneumatic; and the only reason the excessive air pressure is used is that it is necessary to maintain the shape of the tire (not to carry the load) and prevent deflection which primarily destroys the tire due to the working or intermovement of the dissimilar materials of the tire wall, the fabric or cord and the rubber composition.

The remedy for this appears to be two-fold:

(a) Improve the quality and strength of the rubber, have only one homogeneous material (as in a solid tire) and do away with internal movement, friction and heat of the dissimilar elements; for, assuming a suitable rubber composition, the pressure could be reduced and further bending or buckling of the rubber composition would not

be deleterious so that the air pressure could be absolutely proportioned to the load carried.

(b) If it is impossible to find a suitable rubber composition, the form or shape of the pneumatic cord tire should be modified so that with lighter air pressures the deflection would be so modified as not to injure the fabric and also produce better riding qualities. This can undoubtedly be accomplished and would produce a saving of from one-third to one-half in the material of the tire and a corresponding saving in the price and weight.

As long as we continue to use the present form of round tires, some form of base filler strip should be introduced, as shown by drawings attached, so as to prevent the tire riding upon the rim in case of deflation and prevent injury from rim cutting, etc. In the event of puncture or deflation, the truck or car could be driven to its journey's end without injury to the tire, and there is no patent on such an arrangement in this country, although in Germany this device is patented and in operation.

The original pneumatic was the old single piece hose pipe tire, and from this developed the pneumatic with casing and inner tube and clincher rim exactly as used to-day, but with this great distinction that all the early tires were designed to carry relatively light loads, which could be supported with light air pressure, giving very easy riding and reasonable bending or deflection without injury to the tire.

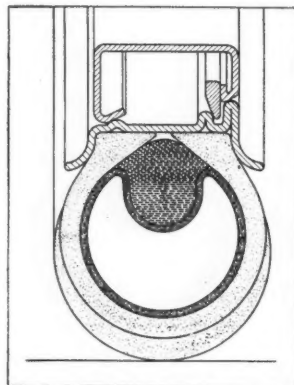
From this we have developed to the present day pneumatic, with very heavy loads to be carried, high air pressure to prevent deflection and relatively hard riding qualities. Try riding a bicycle with tires pumped up to 80 to 90-lb. pressure and you will have a perfect demonstration!

Having started with small light tire loads, the round tire was perhaps the natural evolution, but had we started with larger tires and heavier loads, it is quite possible that an entirely different form of tire would have been evolved.

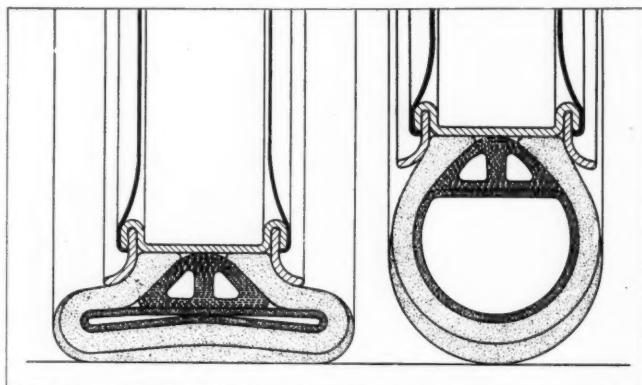
In any case it is a mechanical proposition and is not unlike attempting to build a building with spherical or curved side walls. If you were building a one-story building with double curve (curving out and then in) side

walls the problem is easy until you add weight to the structure, then you must add cross-stays to stiffen the curved side walls, and no engineer would think of building a Woolworth upon such double curved side walls, but would rather adopt the general form of construction as typified by the Eiffel Tower, having single inwardly curved side walls to give strength and lateral stability with a minimum of material for stays or braces.

Now the round pneumatic tire exactly typifies the first construction; it has double curved side walls and also has the stays to stiffen the side walls, just the



Suggested pneumatic tire design of all rubber construction



Base filler strip suggested for present type of tire

same as in the Woolworth Building, but in the case of the tire this staying or stiffening is created within the tire by pumping the air pressure so high that it keeps the tire from buckling. What is wanted, however, is an Eiffel Tower effect with a broad base, producing a pneumatic suspension combined with perhaps partial or indirect compressibility in a tire and having only the air pressure necessary to carry the desired load without over-straining the fabric.

If the desired effect can not be produced with the round tire carrying lower air pressures, by improving the methods of manufacture of the rubber composition and doing away with cord or fabric wholly or in part, the solution must be sought along the lines of a broad base construction. Certainly it appears unreasonable to have a 10 in. depth of air as in the 12 in. tire to suspend the weight, when the actual flattening under ordinary conditions is only, say, 1 in., or when striking any sharp or hard substances, from 2 to 4 in.

The projected cross-section of the air column is the determining factor, and combined with this should be the minimum depth of air pressure, provided, of course, there is always a true pneumatic suspension; and the reduction of depth would also reduce side strains.

Further, this construction would do away with the necessity for large diameters; all sizes of tires could conveniently range between 30 and 40 in. diameter, beginning as now with the 30x3 in. and ending with 40x12 in. (instead of 48x12 in.).

Another outstanding defect of present tire construction seems to be the depth of the side ring of the rim, whether fixed or loose, rings as deep as 2 in. being used on the largest sizes. This, too, originated with the old-fashioned clincher rim designed for use in connection with the soft-beaded tire, where it was necessary to stretch the tire over the clincher, whereas now all tires except the 30x3 in. have straight sides, and, having a wire stiffened or hard rubber bead edge, are practically inextensible and do not, in fact, require the deep side ring. The deeper the side ring the heavier the car rides upon the ring, unless a filler as suggested above is used, and the greater the chance of destroying both tire and rim. Imagine a 48x12 in. tire with its heavy wires requiring a 2 in. side ring!

W. J. P. MOORE.

New York City.

Gear Design for Durability

Editor AUTOMOTIVE INDUSTRIES:

ALLOW me to express my comment on your good work in compiling such an issue as the one of June 10.

The various articles and information contained in it will greatly add to the field of automotive engineering knowledge.

The writer has taken special notice of the article on "Gear Teeth Sizes from the Standpoint of Durability," by Joseph Jandasek.

The subject of gearing for tractors and trucks is practically new and it is gratifying that an attempt has been made in that direction. The author has tried to cover the field as much as possible; however, but there are a few points which he has omitted, and some statements are made that are contradictory from certain points of view. I therefore take the liberty of asking the author the following questions:

1. On page 1307 the author states that a coarse pitch does not help to resist the crushing of material on the tooth surfaces. It is a well-known fact that the deeper a gear is case hardened, the more wear it will stand. Since in a coarse pitch gear the case may be deeper than in a

fine pitch gear, it follows that a coarse pitch will help in resisting the crushing of material on the tooth surfaces.

2. The author states that the action in gears is partly rolling and partly sliding, yet he fails to consider this in the discussion of the design. Is not a set of gears having more rolling than sliding motion more durable than the one having more sliding than rolling?

3. The writer is at a loss to understand why the author did not touch upon the design of the parts of gears; that is, the addenda of both gear and pinion. The addenda control the arc of action, the ratio of roll to slide and the factor γ .

Is not the author aware of the fact that for ratios of 2 and more the modern method of designing gears considers the percentage of roll as the prime determining factor in the life of the gear? It is impossible to discuss wear on gears without a definite consideration of this factor. To show the importance of this, I wish to state that the writer has designed a set of gears using the same ratio, pitch and obliquity but changing the tooth parts; the result thus obtained represented the difference between a successful drive and a failure as regards wear.

4. Will the author kindly give the derivation of his formula (22)

$$W_+ = W \left(1 + \left(\frac{1000}{V} \right)^2 \right)$$

Also his authority in making an assumption of ± 0.25 per cent error in velocity each inch of pitch line travel. Has the formula (22) been derived for the above error? If so, what about different errors? Would (22) remain the same or would it have to be changed?

From text books on physics, the writer assumed that the first law of Newton was universal, and he therefore could not understand that the applied load or W has any influence on the additional load due to change in velocity. It seems to me that no matter what the applied load is, the additional load for the same change in velocity will be the same. However, I am willing to reserve the discussion of this until after the author gives the derivation of the formula (22); maybe it will then be understood.

N. FINKELSTEIN,
Chief Gear Designer,
Brown-Lipe-Chapin Co.

Book Review

Technique et Pratique de la Magneto a Haute Tension.
By A. Courquin and G. Dubedat. Published by Gauthier Villars et Cie, Paris.

Previous to the war there were very few books on magnetos, as the manufacture of these machines in Europe was controlled by a few firms and the strictly technical data were regarded as of the nature of trade secrets. During the war a good deal was written on this subject in both England and France, and the files of technical papers and the proceedings of engineering societies for the past three or four years contain considerable interesting material on magnetos. Recently books on the subject also have begun to make their appearance, but these for the most part are of a more popular character and addressed to a larger public.

The book here under review seems to be intended mainly for the ignition expert who has to install the magneto and keep it in repair. It is of an elementary character. The functions of the various parts of an ignition magneto are described and instructions are given concerning the installation of magnetos on both stationary and rotary engines.

The book is of pocket size and contains 112 pages of text and illustrations.

Time Is Ripe for Experiments in Industrial Co-operation

There is a lull in the storm of labor unrest which has pervaded the country. This does not indicate that the problem is settled, but provides a time for examination of the question and for talking it over with the more responsible men. The railroad situation is also discussed here.

By Harry Tipper

REPORTS received from a number of different points and from various industries indicate that labor efficiency is increasing somewhat from the low point established a few months ago, and is approaching more nearly the general average of its pre-war effort. Small percentages cut off from the maximum employment at this time have made no difference in the actual amount of production, and while the rate of pay is just as high and in some individual cases slightly increased over the rate in force at that time, the labor cost per unit of product has a tendency to reduce slightly.

The transportation difficulties, the effect of the high prices and the slackening of the production necessities in some lines have contributed to this result, and it is likely that the efficiency will be somewhat increased during the next six months. The general recklessness which was indulged in after the armistice is decreasing and there is a tendency to sober up all along the line. It will be a great mistake for the manufacturer to imagine, however, that this easing of the situation means that the labor problem is solving itself. It is not to be expected that labor difficulties could remain as they were during the first nine months after the armistice, and it was evident that we were due for lessened activities in the labor union ranks and for a return to a sober consideration of the matter.

This is no indication of the settlement of the problem any more than the drop in temperature in an intermittent fever is an indication that the patient is improving. This return to a certain degree of sobriety and greater conservatism in the labor ranks is, in fact, the opportunity of the manufacturer to study the labor question and put in motion the proper experiments and developments in order to provide the basis for its permanent solution. When men are either reckless or ready to fight, it is pretty difficult to open up discussion and get anywhere. Under those conditions it is almost impossible to talk it over with any hope of arriving at a decent settlement. When, however, the sobering process begins, the time for examination of the matter and talking it over with the more responsible men has arrived. There is no time which could be more appropriate to put into motion any plans of action which have suggested themselves after the thorough study of factory conditions.

It is obvious that workers are still restless, although they are more willing to work and not so ready to stop and fight for the demands which their leaders make.

The continued existence of the 'longshoremen's strike in New York and the fact that the outlaw railroad strike

is not yet settled are indications of both these elements. The continuance of the 'longshoremen's strike indicates the existence of the restlessness on the part of the workers and the progress which has been made by the citizens' organization in New York is evidence that there are a number of men who are feeling the necessity for work. The difficulties which have been caused by the delay in the decision of the railroad board and the prospect of further partial strikes on this account emphasize the fact that the problem is still with us and any terms which the workers deem unjust are likely to see the recrudescence of trouble.

There is no doubt, however, that the workers are feeling the necessity for work more than they did, and that they are returning to their normal pursuits to a greater degree. This is a hopeful sign, provided that the manufacturer will take the opportunity to work out his plans and to get acquainted with his employees, so that some groundwork is laid for the permanent improvement of their mutual relations. In the feverish haste of the production effort of the last year and the general difficulty with labor interruption, many manufacturers have been unwilling to go into this question and attempt the establishment of any experimental machinery calculated to work out the problem. Under the circumstances, this was to be expected.

It is likely, however, that the change which has begun will develop a little further in the next winter and the manufacturer who will use this opportunity, not as an advantage to be seized upon in order to impose his control more effectively upon labor, but as an appropriate time in which to establish his ground-work, justify himself to his workers and talk it over with them, can do more effective work and provide himself with a basis for the more peaceful settlement of any further difficulties.

The elements which enter into this situation have been discussed frequently in these articles, and there is no necessity for including them here. The emphasis should be laid upon the possibilities which are contained in the approach of a period of less labor interruption and less acute difficulty with labor.

Reports from Great Britain would indicate that the production per man is on the increase and that more people are regularly at work. There are a good many strikes as yet in that country, but they are settled without so much difficulty and there is a very definite return to a more normal state of affairs. This does not mean that the power of trade unions in industry or the power of the labor party in politics has been decreased. There are

evidences that this power is increasing. It does mean that necessity has suggested the wisdom of a more conservative attitude with connection of present difficulties and the desirability of avoiding interruption wherever possible.

The most serious problem presented at the present time in connection with the question of labor is the one which has to do with the public service and transportation. The arteries of communication and transportation must be kept open at all costs and it is evident that some means must be found to eliminate the constant possibility of interruption between one or another branch of these important industrial developments. They are not localized in connection with any particular establishment, and it is not possible to arrange them in small units so that the interruptions and grievances can be localized to some extent.

While the local conditions of living vary, the fact that the railroad organizations extend over a large part of the country and are subdivided into well-defined national occupations, with a common groundwork of service, makes it almost impossible to establish the individual contact and recognition which can be established in the ordinary industrial plants. Furthermore, the character of these developments makes the interruption more disastrous and gives the public a much greater interest in the peaceful settlement of any difficulty. The right to strike which has developed into the prospect of more or less continual strife in the transportation lines may be questioned as a right, the consequences of its exercise are not open to discussion and means must be found in industries of this kind by which the interruptions can be avoided, the efficiency can be continued and the public interest can be decently served.

A good many suggestions have been made involving possible machinery for the settlement of these difficulties, but

none of the developments which have taken place so far give much promise of improving the situation materially. In these industries it is obvious that the trade unions are sufficiently representative of the workers that they will continue to act as spokesmen for the various occupations involved. Their demands have not been satisfied, however, by previous settlements, and there is no evidence that a point of satisfaction can be reached by the machinery provided for under present governmental regulation or through the adjustment committees appointed by the public utilities and the unions together.

We have pointed out in these articles from time to time that labor in power is just as likely to take advantage of its position as the owner of industry when the power is on his side. The actions of the transportation workers in Great Britain and this country emphasize this proposition and indicate that we must secure an entirely new viewpoint on what constitutes public service in the minds of the workers and the employers alike, if we are to avoid difficulty and possibly serious disturbances in the transportation and communication operations.

Already there are indications that some of the railroad employees are prepared to attack the settlement of the railway labor board, even before its provisions are issued; and there is little doubt that the compromise which must be affected will not satisfy the workers more than temporarily.

Railroad negotiations from the side of the railroad owners and the unions have not been notable for the spirit of square-deal, and unless we can find some methods of establishing this kind of spirit in connection with public service of this character the transportation difficulties are likely to increase because of the constant interruption and lack of efficiency.

The Danger of the Easiest Way

SUCCESSFUL business men constantly tell the younger generation that the only way to real success is through hard work, patient learning, and abiding determination. In accomplishing practically every task they have found this to be true, yet often when it comes to dealing with industrial relations they fail to apply their own rules for success. Labor troubles have been all too frequent of late, while "outlaw" strikes and disturbances of a similar nature seem to leave the employer more and more at sea as to the underlying causes. Consequently, a number of employers are catching at straws, in the vain hope of solving their labor problem. They seem to work on the "try-anything-once" principle.

Not long ago the general manager of an Eastern automotive plant was interviewed concerning labor conditions in his plant. In the course of the conversation, he mentioned some literature that he was having sent to his men weekly. The plan works in this way: The manufacturer pays a certain monthly sum, according to the number of men in his plant. In return, he is furnished by an industrial relations service with bulletin boards and weekly bulletins. In addition, a weekly printed letter is mailed to each of his employees.

The employees do not know the source of these letters and are not supposed to know that they are being paid for by the employer.

"I just started this thing a few weeks ago," the general manager said, "and I don't know how much good it is. The man that sold it said that this service was rendered at cost with no profit."

"What kind of an organization is it?" was asked.

"I really don't know," was the reply. "I've forgotten its name, and I don't know who runs it. In fact, I'm just a little suspicious of it. I don't know whether or not it is a fake."

"Do you know what is to be in these letters before they come out?"

"No. I get a copy at the same time the men do. It is mailed to their homes."

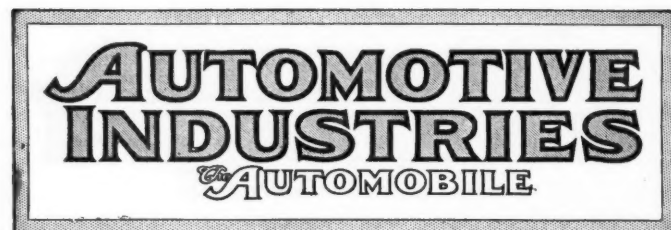
The problems of industrial relations cannot be solved in this way. So many objections to attempts of this sort suggest themselves as to make it difficult to choose the most important. A brief summary might be as follows:

1. Every attempt of this kind must have some effect, either good or bad. The employer hopes it will be good. That is not enough. He must be certain it will be good, otherwise it is likely to be bad. He can be certain only by careful investigation both of the source of the literature, the literature itself, his own men, his own plant conditions and the human mind.

2. The employer pays to have something sent to the men with the definite idea that they shall not be aware of the fact. If this ever becomes known it is certain to mean a lessening of confidence in the management. The arrangement lacks frankness.

3. This service goes to many plants. It is a general service, supposed to apply to a specific case. Labor problems rest chiefly upon a careful study of the individual. Thus granting the honesty of purpose of the service, it cannot accomplish its end.

The employer cannot find any easy road to the solution of his labor problem. By trying to solve it with a set of letters, he is only laying up more trouble for the future. In the meantime, he is giving an outside free-lance writer an extremely great influence with his workmen.



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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Sales and Service

A FEW days ago a New Yorker, who is the owner of an "orphan car," required a replacement part to enable him to operate his car. He knew that the exact part he wanted was used as recently as three years ago by a car that is among the ten best sellers; so he went to the service department of that car and was told that they could not supply the part short of several weeks' notice. Then he went to an "orphan car parts" service station and got what he wanted over the counter.

In the conversation that followed, the protector of orphan cars told the customer: "Most of our business is not for orphan cars, but for live ones. Not a day passes but we supply parts for cars now in production because the service station of those cars cannot do so."

This appears to be quite a serious indictment of the service methods of the manufacturers of some of the popular cars. The parts dealer referred to is an enterprising individual. He goes to the parts fac-

ories and gets his merchandise and brings it to his shop in compartments of Pullman cars. But, at that, he is not displaying any more enterprise than some car manufacturers in obtaining the parts necessary for the production of new cars. The incident merely goes to show that at least some manufacturers regard the production of new cars as being of much more importance than service to the cars already sold. Some day it is going to be realized that the keeping of cars sold is equally important to making new ones. The manufacturer who realizes this first is the most likely to have the most friends when selling again becomes necessary to trade.

Economical Plowing Speed

IN discussions of the questions of what constitutes the best or most economical plowing speed, most of the argument adduced so far has been in relation to fuel costs. A rather commendable effort has been made to eliminate the item of labor cost from the comparison, by basing it on equipment of equal working capacity, as, for instance, a two-bottom plow working at 3 m.p.h. and a three-bottom plow working at 2 m.p.h.

Experimental data from different sources seem to indicate that in such a comparison the smaller equipment has slightly the better of it. However, a very important factor in determining the choice of the farmer is the first cost of the outfit. As long as the same amount of work is being done, the size of the power plant, and consequently its cost, will be the same, but the two-bottom plow certainly will be cheaper than the three-bottom plow and the two-plow tractor also will be somewhat cheaper.

It hardly needs to be emphasized that a lower first cost appeals to the farmer. Two of the important items in the operating cost of a tractor—the same as of any other machinery—are interest on investment and depreciation of equipment. Now, the interest on investment is directly proportional to the first cost of the equipment. Depreciation charges also depend upon the first cost, but there is another factor entering here, namely, the respective lives of the low speed and high speed equipments. Even though the two equipments consume substantially the same amount of power, it can hardly be doubted that the high speed outfit is subject to more wear and tear. For instance, those who witnessed the high speed plowing at Ottawa Beach, with a caterpillar tractor at 5.7 m.p.h., must have been convinced that the wear on the chain track and chain wheels at this speed was considerable. The situation is further aggravated by the fact that the high speed tractor must travel 50 per cent farther than the low speed one.

The speeds above mentioned, 2 and 3 m.p.h., are really not those in controversy at the present time; any speed below 3 m.p.h. is now considered low speed, whereas the high speeds referred to range from 3½ m.p.h. up. From the foregoing it will be seen that any conclusion regarding the relative merits of high speed and low speed plowing which does not take into account the first costs of the equipment is of little value.

Advertising the Industry

A MOVEMENT that should have a far-reaching effect was started last Friday when the Advertising Managers' Council of the Motor and Accessory Manufacturers' Association instructed its executive committee to communicate at once with the National Automobile Chamber of Commerce, the Society of Automotive Engineers, the National Automobile Dealers Association and other organizations engaged in the promotion of the automotive industry, to formulate plans for a united advertising campaign to show the "stability and essential character of the industry."

If one might judge from the discussion of the motion, this group of advertising men seek such an arrangement without prejudice as to method but with a clear idea of the objective. The feeling at this meeting was that the present credit difficulties were brought on because the bankers and the great public had never been sold on the idea that the automotive industry was a transportation industry, and that it holds the best and quickest possible relief of the present badly tangled transportation situation—not the cure but a relief.

The speaker who brought up this subject suggested several methods of accomplishing the desired end:

He offered to use his entire advertising space for the period of a month or more to present such subject matter as might be approved in a conference.

That a special campaign be organized and conducted by a special committee.

That entirely outside means be used, such as a special reel of moving pictures for general distribution.

This man was willing to join in any or all of these means toward reaching the end or to aid any other means that might be approved. The applause that greeted this offer indicated the same attitude was held by all of those present.

When the motion was passed, only one suggestion was made to the executive committee. It was that the action indicated be taken as soon as possible, so the proposed campaign might be get under way as soon as possible. The men present were willing to undertake a campaign of their own, but they felt that better results would come from a co-ordinated campaign and that probably from a multitude of counsel there would come greater wisdom.

It is to be hoped that this suggestion will quickly bloom into results. Those of us who are in and closely associated with the industry do not appreciate always the attitude that outsiders sometimes hold toward us. We have studied our products and we know their possibilities for good. We admit it freely and we have assumed that our admissions convinced the other man. We were inclined to rest on the decisions of the War Industries Board and to assume that the priority given to the truck then settled the question for all time. But recently we have been forced to conclude that this decision would not rule for all time, and that some persons were not yet convinced that even the truck is entirely essential.

Credit Tension Eases Slightly

Reserve Banks Check Speculative Loans

Business Reacts to New Conditions Without Disorder—Railroad Needs Important

NEW YORK, July 20—A slight easing in the tense credit situation has been apparent in all sections of the country for the past ten days, but there is no reason why it should be hailed as a harbinger of the "all clear" sign for the automotive industry. It simply means that attempts at deflation are meeting with success and that with the curtailment of loans for speculative and profiteering purposes more funds are available for legitimate business.

One of the most encouraging signs of the times is that the readjustment of business has been brought about with so little disruption. There have been a few financial cracks here and there, but nothing which in any way resembles a crash, and business engineers are beginning to breathe more easily. They are hopeful that the country can be restored to a condition resembling normal without any really serious disturbance, although there are many phases of the situation which still are filled with dynamite. This was the aim of the Federal Reserve Board.

There has been a disposition in some quarters to impute to the Reserve Board and the member banks selfish motives in restricting credit. The assertion is frequently made that their purpose was to raise interest rates and thereby enhance their profits. There seems no real basis for this contention, at least so far as the Federal Reserve is concerned.

Bank Reserves Remain Low

Since the inception of the Federal Reserve system it has been an axiom that if the reserves were to fall below 40 per cent of the total liabilities the danger point would have been reached. To go below this point, it was held, would not be consistent with banking caution. In January, 1919, the reserve percentage was 51.2. In January last it had fallen to 43.7. In February it had crept up to 44.1, but in March it had slumped to 42.6.

It was then that the board began to take drastic action to bring about liquidation, but in spite of the efforts which it has made the first report for July showed a reserve of only 42.8. It has not been above 42 and a fraction since February. At the time of the armistice it was a fraction above 50. It is apparent, therefore, that there can be no great loosening of credit until the reserves

reach a considerably higher level. The figures given are for the entire system and vary in the different districts. Reserves in the New York district, which is the cornerstone of the whole, have been down slightly below 40 per cent.

It must be remembered that enormous sums will be needed to finance the crops which are beginning to come into the market now. The peak of this burden will not be needed until fall. The credit situation is bound up so intimately with transportation that it is difficult to separate the two.

Farmers Storing Crops

A large part of last year's crops has not been moved because of the car shortage. Farmers have been warned that they must prepare to store much of this year's crop themselves because of the shortage of warehouse space resulting from the lack of cars. This means that the farmers must be financed pending sale of their produce.

A vast amount of credit which might otherwise be liquid will be tied up for this reason. Inability to market crops will have a tendency to hold up food prices, and until food prices drop the cost of living cannot be restored to a normal and stable basis. Until that is done there can be no stabilization of business or industry.

No gift of prophecy is required to see that no matter how much credit is available and no matter how auspicious other conditions may be, there can be no permanent stabilization until the shortage of transportation is relieved. The carriers can afford no great relief until they get additional equipment. They will be unable to materially enlarge their supply of rolling stock before spring.

The final analysis means that from now until spring the railroads will be forced to bend all their energies to the movement of food and fuel and that they can handle only a fraction of the general business which will be offered them.

Experienced Dealers Get Credit Sought

MINNEAPOLIS, July 16—Indefiniteness over the money situation as affecting dealers is clearing up, resulting in a better feeling. The dealers know what to expect from the banks and the distributors, therefore, have a better idea what to expect from dealers. Dealers who have been in the business for years generally know what is right to ask from the banks and get what they ask for, but less stabilized dealers have been scared off by money tightening. Conditions are no worse and business continues along an even course. Car shipments are being received regularly.

Maryland Bankers Canvassed on Loans

Baltimore Distributor Seeks to Dispel Uncertain Attitude Toward Industry

BALTIMORE, July 19—E. R. Myers, president of the Baltimore Automobile Dealers' Association and head of the Motor Car Co., distributors for the Willys-Overland line, is engaged in a plan to make county bankers recognize the automotive industry as being basically sound, and that every county dealer worth while deserves the same consideration on a question of credit as any other line of business.

To this end Myers has his sales manager and his territory man on a tour of the State. The purpose of these two men is to go into every community where there is an Overland dealer and to arrange for a conference between the dealer and his bank officials.

"This trip," said Myers, "is to prove to the banker in the rural communities that the automobile business is on a firm foundation and not alone deserves, but demands the same treatment from financiers as any other business. We are proving to these bankers that we have faith in our dealers, because they represent the type of men that help communities to grow. We are proving to them that we have faith in them and in our products by guaranteeing to the banker that we are prepared to stand behind him to the full extent of every car on which he makes a loan for our dealers."

Big Banks Don't Quibble

"We are not having any trouble obtaining money for big consignments of cars shipped here. That is, the distributors here are not having it because we would not do business with any bank that began to quibble with us, for our trade is worth something to a financial institution and if there should come any halt there will be a quick showdown."

"By our going out into the various counties of the State and showing these men where we stand it is just like having the Willys-Overland Co., or any other large corporation, come to a banking institution here and show they are behind us. Indications already in hand point to an early understanding of the situation that is bound to bring about a better recognition of the automotive business."

"Of course some of the finance companies here are demanding extraordinary charges in making loans on individual sales, but this is bound to be righted in a short time."

Detroit Production Increases

June Forges 5000 Ahead of May Total

Figures Cause Optimistic Feeling Among Manufacturers—Demand Still Leads Supply

DETROIT, July 19—Approximately 5000 more passenger cars and 400 more trucks were built in the Detroit territory during June than were turned out in May. Passenger cars totaled 161,261 and trucks 19,943, as against 156,178 and 19,532 in May.

The month's figures will serve in great measure to lift the spirits of leaders in the industry, many of whom had been confident that the month's report would show a decided drop in production due to the financial stringency and the ever-present transportation congestion. It was stated during June by many men in position to know, that the month's production schedules would be curtailed 50 per cent. As a matter of fact the output for the month is close to 40 per cent under the June schedules outlined by manufacturers at the beginning of the year, June being the peak month.

Many persons confused the predicted 50 per cent reduction in schedule with the production for May and naturally are agreeably surprised to find that the factories in most instances, were able to overcome difficulties to a great extent and beat the record for May.

The increase shown in passenger cars as well as trucks is due in great measure to the Ford factory. Ford turned out 72,931 passenger cars and 10,931 trucks during June as compared with 70,000 cars and 10,000 trucks in May. Dodge also showed an increase over May as did Buick, Overland and the majority of the others. The increase, though slight, helped to swell the total and engender a spirit of optimism taking the place of the pessimistic attitude that was apparent a few weeks ago.

Freight Situation Better

While there is some difference of opinion as regards the freight situation there is no question but that it is showing improvement. This is traceable to a great extent to the fact that manufacturers have called in their stock chasers and are not burdening the railroads with materials as they were.

Two months ago factory representatives were hounding the supply centers, grabbing material without any consideration as to price in the desire of the manufacturers to build up an immense surplus stock in order to guard against any shortage. The result was that when the financial scare broke many of the fac-

tories had their warehouses and yards piled high with materials of all kinds, the inventories in some factories running well up into the millions. Fear of the attitude of the banks prompted them quickly to begin unloading this surplus and turning it into cars and trucks.

While there has been a sharp decline in the demand for cars, factories in nearly every instance are behind with orders and are able to get rid of their cars. What effect this lack of demand will have as soon as factories have caught up with back orders is problematical, Detroit dealers and distributors, admitting there is at present no demand for cars.

Sales Prospects Better

Manufacturer, distributor and dealer have had their heads together during the last few months planning ways and means to overcome the financial stringency and there seems to be a feeling among them that they have arrived at a solution of the problem. The country dealer who has been hardest hit by the attitude of his banker is receiving the active co-operation of his distributor who in turn is being given all possible aid by the manufacturer. Bankers, too, particularly in the automotive centers are working in hearty co-operation and close harmony with manufacturers.

Dealers and salesmen who enjoyed what was virtually an extended vacation during the last year are busying themselves with sales efforts and this is expected to bring about a renewal of demand for cars. Vigorous campaigns have been started all along the line and the dealers now are devoting their energies to rounding up legitimate prospects.

The slowing up in demand is felt all down the line. Tire makers naturally are affected to a great extent, not alone in curtailing production schedules but by the general feeling of fear on the part of the public caused by rumors of depression that still persist and make car owners think a long time before they discard their patched tire for a new one.

Some of the Detroit factories are taking advantage of the lull in the domestic demand to invade foreign countries and create a market. A great portion of the output of the Hudson factory every day is going to foreign countries and the same is true of many other factories.

THE index for AUTOMOTIVE INDUSTRIES covering the first six months of 1920 will be off the press within a few days of this issue. It will be published as a separate pamphlet, not being included in a regular issue. Inquirers requesting a copy will be furnished one without delay.

Fords Take Over Kentucky Coal Mine

Company Reported Seeking Other Mines—Deny All-Metal Body Story

DETROIT, July 20—Henry and Edsel Ford by a deal consummated yesterday have taken over a Kentucky coal mine operated by the Banner Ford Coal Corp., in Harlan County. The automobile manufacturers paid \$1,500,000 for property of which a million was cash and the balance notes.

Frank L. Klingensmith, vice-president of Ford Motor Co., said to-day the purchase of the mine would have but slight effect in aiding Detroit as the output would hardly meet one-fourth of the demand of the Ford properties in Detroit and other cities. The mine produces exceptionally good bituminous coal for manufacturing purposes according to dealers here. Klingensmith could not give the approximate output of the mine but dealers say the corporation is one of the largest in Kentucky field. Klingensmith would make no statement regarding reports that the Ford company was negotiating for other coal properties in Kentucky and West Virginia sections.

Klingensmith also took occasion vehemently to deny a story published to-day to the effect that Ford was developing an all metal body. The story also said the manufacturer was preparing to bring out a new engine that would minimize if not eliminate vibration. The engine is being developed in a workshop adjoining the Ford mansion at Dearborn according to the publication but Ford officials denied knowledge of it though they would not say that it was not a fact. The statement regarding the all-metal body, however, Klingensmith characterized as absurd in the light of Ford's recent timber purchase.

ST. LOUIS MAKES NEW TRUCK

ST. LOUIS, July 17—The Luedinghaus-Espenschied Wagon Co. of this city, which has been manufacturing farm wagons and logging trucks for the past 77 years, has recently entered the motor truck field. The first model to be completed is of 2-ton capacity and will be known as Model K. It is stated that this is the forerunner of a complete line, and announcement will be made within the next few months of 1½-ton and 1-ton sizes. The 2-ton, model K, is equipped with a Waukesha 4-cylinder, 4½ x 5¼-in. engine, a Borg and Beck clutch, a Detroit selective transmission, and a Wisconsin worm drive axle with a reduction ratio of 8.66 to 1.

Special Cables

French Lift Import Ban on Automobiles

Decree Coming This Week Repealing Government Prohibitions Established in April

(By Cable to Automotive Industries.)

PARIS, July 17.—A decree will be issued this week repealing the French import prohibitions established April 23, thus allowing automobiles, parts and tires to be imported into France on payment of duty. Without waiting for the decree to be signed, instructions have already been given customs officials at French ports to admit automobiles.

By the original decree which was aimed to reduce the high rate of exchange with America and Great Britain, no restrictions were placed on the importation of trucks and agricultural tractors, the ban being leveled chiefly against passenger cars. The restriction applied also to other motor vehicles weighing less than 5511 lbs., whether or not equipped with body, motor boats, airplanes, airships, flying boats, balloons, steel and iron rims for motor cars, automobile tires and all rubber goods.

It was expected at the time the decree became effective that the natural result would be increased cost in the price of cars in France which was already abnormally high.

According to official figures the importation of American cars into France for the fourteen months ending last February totaled 981, representing a value of \$2,262,039, while for the same period 3623 trucks were taken into the country of a value of \$15,449,608.

Bennett Race Date Set

The date of the airplane race for the James Gordon Bennett trophy has been set for Sept. 28. It will be flown over a 60-mile course near Paris. There will be three American entries in the contest. One of them will be by the United States army. It has been expected that Major Schroeder, who established the American altitude record, would fly this machine. Reports have reached Paris that Schroeder has been reduced to the rank of captain under the new organization of the United States army and that he may retire from the service, but his admirers here are hopeful he will enter the contest. Another entry will be made by the Dayton-Wright Co., and the third either by Elen Curtiss or the Aero Club of Texas.

It is expected that a new world's speed

record may be established in the race, which has aroused deep interest in France and all over Europe, in fact.

Another Airplane Competition

The French government airplane competition has been fixed for Aug. 15. The competitors will be Caudron, Breguet, Farman, Bleriot and Latecoere.

News of the lifting of the French import restrictions brought forth an announcement from the Ford interests here that the assembling plant at Bordeaux, France, which has been closed for several months, would be re-opened at once. It was said that the plant had sufficient parts to start operations at once.

BRADLEY.

Appraisers Fix Duty on Imported Springs

NEW YORK, July 19.—The Board of United States General Appraisers has just decided that imported automobile springs which have been finished as such, but which require minor operations to be applied thereto, such as painting, cleaning, testing, and slight reaming where necessary in the bushings, are properly dutiable at the rate of 30 per cent ad valorem under the provision in paragraph 119 of the act of 1913 for "finished parts of automobiles." The board further finds that it was not the purpose of Congress to exclude from said paragraph fully completed and assembled parts. This decision overrules protests filed with the Customs Board by John V. Carr of Detroit. The merchandise issue was described on the invoice as "steel springs," "rear springs," "front springs," and "front automobile springs." Duty was levied thereon at the rate of 30 per cent ad valorem under the provision in paragraph 119 of the act of 1913 for "finished parts of automobiles, not including tires." It is claimed by the importer that the articles are properly dutiable at the rate of 20 per cent ad valorem under the general provision in paragraph 167 of said act for manufactures of metal not specially provided for.

NAVY DIRIGIBLE BURNS

AKRON, OHIO, July 19.—The United States Government dirigible, D-1, the first of a fleet of airships which the Goodyear Tire & Rubber Co., is building for the army and navy and which recently had its official test, was destroyed by fire to-day in its hangar at Wingfoot Lake together with two balloons owned by the company.

DURALS TO HAVE WHISTLERS

NEW YORK, July 19.—Dural tubes from now on will be equipped with whistlers by an arrangement entered into between the Dural Rubber Corp. and the Automatic Safety Tire Valve Corp. The tubes with the new equipment will be 35 cents over the previous list price.

British Subsidy Urged for Aviation

Advisory Committee Recommends £250,000 Sterling Appropriation Yearly for Development

LONDON, July 1 (Special Correspondence)—According to the American Chamber of Commerce in London, the advisory committee set up by the British Government to consider what steps should be taken to develop civil flying has reported in favor of a state subsidy, to be limited to a maximum of £250,000 sterling, for a period of two years.

This committee was hastily resuscitated as a result of the outcry raised by the public some few months ago, when it became known there was a possibility of the London-Paris air service ceasing, owing to a lack of financial support.

It is also emphasized by the committee, says the American Chamber, that it is of the highest importance that British prestige in the air, won during the war, should not be lost, and that every effort should be made to maintain designing staffs at high level by the placing of orders for experimental machines by the Air Ministry.

Other recommendations of the committee are that assistance should only be given to companies proceeding on approved routes and should be calculated on a basis of 25 per cent of the total gross revenue earned by the carriage of passengers, mails or goods. The approved routes will be London to Paris and extensions, London to Brussels and extensions, and England and Scandinavia.

AUSTRALIA PROTESTS TAX

WASHINGTON, July 19.—Consul General Sammons has advised the Department of State that the campaign conducted by the Federal Council of Motor Traders of Melbourne against higher tariffs on automotive products is making considerable headway. In support of their arguments the motor dealers of Australia have submitted statistical data showing that fully 5 per cent of the motor cars imported are purchased by people residing in the country districts. It is claimed that orchardists and other agriculturalists are almost wholly dependent upon the motor truck for the transportation of their products. The users of trucks and pleasure cars have united with the dealers in protesting against increased tariff schedules.

COLUMBIA AXLE BUYS SITE

CLEVELAND, July 19.—The Columbia Axle Co. has purchased the land and property of the Properties Co. along the New York Central railroad in this city. The property was acquired through purchase of the common stock of the Properties Co., in a deal involving approximately \$1,000,000.

Packard to Develop Dirigible Engine

Navy Department Orders Five Experimental Types as Step to Aid Industry

WASHINGTON, July 19—Orders placed with the Packard Motor Car Co. for the development and construction of five experimental internal-combustion engines for use in naval dirigibles is the first step toward a general plan for Governmental assistance to the aircraft industry. The Navy Department intends to encourage both manufacturers and designers in perfecting types of American engines which will be a distinct improvement upon all European models. The contract with the Packard company calls for an engine permitting of 100 hours' operation at full power without overhaul or adjustment, and of 400 hours' operation at three-fourths' load before a major overhaul is necessary.

The Navy Department's contract was signed a few days ago. Naval officials made it known that they are placing their confidence in the ability of American automotive engineers to produce an engine which would excel under test any aerial engine now manufactured and used abroad. While the general requirements of the Navy Department, as sent out last month to representative American engine manufacturers, did not mention any particular make of foreign aircraft engine, it became known that the Government was anxious to experiment with an internal-combustion engine, designed along the general lines of the Maybach, which has proved so successful in the Zeppelins. Emphasis was placed upon the fact, however, that the Navy Department wanted a marked improvement on this type of engine.

Quick Deliveries Wanted

Though the Navy Department has advised the manufacturers that quick deliveries are required, they have made it clear that the result should not be obtained at the expense of efficiency. They want the five experimental internal-combustion engines designed especially for installation in rigid airships. The Government insists that the engine shall have vertical power cylinders arranged in a single bank and of such number as to produce in operation a turning effort whose variations from maximum to minimum shall not exceed in magnitude the corresponding variations in turning effort of a well-balanced six-cylinder vertical in line internal-combustion engine operating on a 4-stroke cycle. Naval engineers believe the best results will be obtained when the form of the engine is such as to permit the greatest possible degree of accessibility for repairs and adjustments to the engine while it is mounted in the airship. The contract provides that the designs shall take into consideration the fact that mechanics

can remove the engine from its mounting without much disturbance to the piping and other accessories.

Wide latitude is given the Packard engineers in the design and construction of the clutch. The suggestion is offered, however, that the engine be designed so as to drive a propeller through a clutch mechanism.

After a thorough study of the mechanical angle of the transatlantic flight of the Navy's NC's, naval engineers have formed definite conclusions as to what power engines used in dirigibles should develop. As a result they have incorporated many of their ideas in the official suggestions to the Packard company.

Many Specifications Outlined

In the first place they want an engine suitable for operation at altitudes varying from sea level to at least 2000 ft. Second, the engine shall be capable of developing continuously not less than 300 hp. and not more than 400 hp. while at sea level under standard atmospheric conditions. It is specifically provided in the contract that the manufacturers shall produce an engine whose revolutions per minute corresponding to full power shall not exceed 1400, nor be less than 1000. Furthermore, the department wants an engine so designed as to idle at a speed of approximately 250 r.p.m. without misfiring or irregular running. The specifications call for a governor which will prevent racing of the engine when the clutch is disengaged or the load otherwise disconnected. The governor is to be arranged to stop the engine in case the lubricating oil pressure falls below a safe working limit.

The designers are urged to give special attention to the lubricating system. The Government wants the lubricating features prepared so as to permit the use of mineral lubricating oils. The dry sump system is the only one which the navy will approve. They will use pressure feed to all bearing surfaces, with the exception of the wrist-pin bearings and cylinders, which may be lubricated by splash or oil mist from the crank case and cranks. The designers must arrange the duplex oil strainers so that either strainer can be removed for cleaning without interrupting the operation of the engine.

To Have Tachometer Drive

A tachometer drive must be incorporated in the design of the engine. A water-cooling system for the cylinders and exhaust collector is ordered. The mechanism is to be arranged to allow the use of gasoline, kerosene, or heavier fuels in the operation of the engine. The Navy Department says it is desirable that American engineers develop an engine using a fuel less dangerous in storage and in use than gasoline.

Naval officials urged the designers to consider the economy factor and consumption of fuel and lubricating oil. They direct particular attention to obtaining the highest practicable economy over a power range extending from 50 to 90 per cent of full power. The fuel is to be supplied by gravity or pumps.

Ford Investigators Leave for Air Study

Commercial Developments in Eng- land and Germany Interest Michigan Manufacturer

NEW YORK, July 17—W. B. Mayo, chief engineer for Henry Ford, and Col. E. A. Deeds, whose representation of the automotive industries in connection with the American air service is well known, sailed from New York to-day for a two months' trip to Europe, where they will study the present aeronautical situation. Mayo will devote his attention primarily to the study of dirigible airships, whereas Colonel Deeds will interest himself in airplanes. Their trip will take them principally to England and Germany, although other countries will be visited.

"Mr. Ford is thoroughly pleased with the possibilities of long distance aerial travel by dirigibles," Mayo said before embarkation. "It has not been determined definitely that he will undertake their construction, but the decision will rely principally upon my report. I will be especially interested in that phase of aeronautics and will take up airplanes only as incidental. Colonel Deeds, however, will take up that phase."

Mayo declared that his trip followed the recent visit to Detroit and to Ford of the Zeppelin officials who have been in this country for some weeks for the admitted purpose of obtaining financial support for their companies. They have offered, it is understood, to continue construction in Europe or to move their work to this country. Just how this would be worked out in connection with Ford was not hinted, but it is, of course, well known that the Ford interests have developed plans for such construction.

NAME DIRECT DRIVE RECEIVER

PHILADELPHIA, July 19—Henry A. Craig has been appointed receiver of the Direct Drive Motor Co. on a bill in equity filed by creditors. Officers of the company agreed to his appointment. The company has plants in Philadelphia and Pottstown. The financial troubles of the company are attributed to strikes.

According to Russell Duane, counsel for the corporation, there are orders on the books for \$1,000,000 worth of cars, which cannot be filled because of labor troubles. The liabilities are given as \$31,166 and the nominal assets \$47,000. In addition the company has more than \$20,000 worth of parts which it is unable to use because of present conditions.

BIPLANE TO MAKE 173 M.P.H.

NEW YORK, July 19—The plans of a new fast biplane to make 173 miles per hour were brought to this country by Lieut. Cesare Sabelli of the Italian Caccia Air Squadron, who arrived yesterday on the steamer Guiseppe Verdi. The lieutenant would not divulge the name of the plane but will confer with members of the Aero Club.

30,000 Leave Akron in Summer Exodus

Labor Turnover of Little Importance Because of Cut in Manufacture

AKRON, July 19—What is known as the "summer turnover" in the great tire plants here is now at its height, and it is estimated the exodus from the city has taken away 30,000 persons. It is said to be customary for many employees to leave the plants and return to their homes in the summer, but it is significant that the number is larger than usual this year.

In previous years this "summer turnover" has caused serious embarrassment to the manufacturers, but this year it is not regarded as serious because of the curtailed production, and no attempts are being made to fill vacancies.

All the factories except that of Goodyear are operating on full time, although there has been a rearrangement of shifts with a reduction in some of them, particularly the night forces. Goodyear is working on a five day week basis.

While the rubber companies deny they have dismissed any of their factory workers because of present conditions, all of them have cut down their office forces. They explain this by the statement that when business was at its peak they engaged men and women in large numbers and that now when a slump has come they are weeding out the "non-essentials."

TRACTOR COMPANY TO START

APPLETON, WIS., July 19—The Fox River Tractor Co., a \$200,000 corporation organized about 18 months ago at Appleton, Wis., has completed its experimental work and is preparing to engage in quantity production of its new gas and kerosene tractor. A feature of the machine is the three-speed transmission, instead of the usual two speeds, and the generous use of steel parts instead of castings. The gearset provides a road speed, plowing speed, and a third for clay or gumbo plowing, the range being from 1 1/4 to 4 m.p.h. The original factory, 40 x 75 feet, is now being enlarged, and plans made for a main factory unit, 60 x 200 ft., to be erected late this fall. Officers of the company are: President, Frank Saiberlich; vice-president, Raymond Saiberlich; secretary, Raymond Krueger; treasurer, Oscar Saiberlich; works manager, Ervin Saiberlich. The Saiberlichs formerly were heavily interested in the Eagle Mfg. Co. of Appleton, Wis., a large producer of tractors, engines, ensilage cutters, etc.

HERCULES STARTS TIRE PLANT

CINCINNATI, July 19—Options held by the Hercules Rubber Co., a new corporation with a capitalization of \$1,000,000 on 35 acres of land at Bridgetown, Ohio, near Cincinnati on the C. & O.

Railroad, were exercised during the week and estimates on the first of a series of buildings will be obtained as soon as railroad sidings can be laid.

All machinery for the plant, which will make a new inner tubing for automobile tires, is ordered. Plans for the plant now well under way provide for a total of 60 units, each building to be 100 x 200 feet. One of these is to be constructed first, as well as the power plant which is to be 200 x 300 feet, its size being sufficient to provide for the wants of the completed plant.

Edward H. L. Haefner is president of the corporation; Theodore Heck, first vice-president; Gordon L. Heck, second vice-president; Charles H. Adams, secretary, and E. W. Vossler, treasurer.

Steinmetz Electric Buys Site Near Baltimore

BALTIMORE, July 19—The Steinmetz Electric Motor Car Corp. of New York, has purchased 4 1/2-acre site along the Western Maryland railroad on which there are several factory buildings. It expects to equip and have the plant in operation by Sept. 1. Employment will be given at the start to 125 men.

The company will assemble this year 100 one and one-half ton commercial trucks with a cruising radius of 50 miles. They will be tested by electric power companies throughout the country. The company also will make industrial trucks for use in factories and warehouses.

Rolls-Royce Starts Machining Operations

NEW YORK, July 19—Before he sailed for England on the *Imperator*, the announcement was made by Claude Johnson, managing director of Rolls-Royce, that machining operations have been begun in the American plant at Springfield, Mass.

"This means," said Johnson, "that we shall be turning out cars by the end of the year. Already a large number of experts, the pick of the Derby works, whom we selected during the war, because of their experience and their ability to make airplane engine parts, have settled in Springfield. Other mechanics will follow them."

"Although the car will be built in America by British mechanics under British supervision, the fact we accentuate is that it is not a British or American chassis but a Rolls-Royce with all parts interchangeable with those made at the Rolls-Royce factory in England."

CURTISS BUYS FLYING FIELD

GARDEN CITY, N. Y., July 19—The Curtiss Aeroplane and Motor Corp. has bought Hazelhurst Field from the Hempstead Plains Co. The Government used this field throughout the war and it was the headquarters of the air service on Long Island. The field will be used, for the present, for experimental and manufacturing purposes and later will be the headquarters of the company.

Samson Picks Site for Canadian Plant

Oshawa Selected for Manufacture and Distribution of Trucks and Tractors

OSHAWA, ONT., July 19—The Samson Tractor Co. of Canada, Ltd., has decided that Oshawa is the logical place in Canada for the manufacture and distribution of Samson tractors, Samson truck and Samson farm implements.

R. S. McLaughlin is president of the new company and he has already formed a nucleus of an organization to handle these products. C. E. MacTavish, who has been for the past year parts and service manager of the Chevrolet Motor Co. of Canada, Ltd., and previously sales manager of the Chevrolet Motor Co. at Regina, has been appointed sales manager of the Samson company. V. O. Hipwell, late of the Chevrolet service department, has also been appointed to the Samson staff and is now at Janesville, Wis. W. Marshall, who has been a salesman for Chevrolet, has been appointed assistant to MacTavish.

For the time being Model M Samson tractors will be imported from Janesville, Wis., and distributed from Oshawa, as it will take some time to equip a plant for manufacturing and besides there is no duty on tractors of the Samson Model M type. Farm implements, such as the Samson disk harrow, Samson plow, etc., will also be imported, but the Samson truck will be manufactured in Oshawa.

In addition to marketing Samson tractors in Canada, the company will manufacture and sell the Samson truck for the farmer. This truck is made in three-quarter and one and a quarter-ton sizes and is adapted for farm use.

STRIKE INJUNCTION ASKED

CINCINNATI, July 19—Suit has been filed by Haberer & Co., manufacturers of automobile bodies, against the Automobile, Aircraft and Vehicle Workers Union, asking for an injunction to prevent striking workmen from picketing. The company declares it has \$200,000 invested in the business and under normal conditions employs 150 men. The unlawful picketing and alleged intimidation has caused employees who desire to work to remain away, and this endangers the filling of \$300,000 worth of orders now on hand, it is charged.

BUY MARYSVILLE SITE

DETROIT, July 17—Aluminum Manufacturers, Inc., of Detroit, Cleveland and Buffalo, has purchased a site at Marysville, Mich., near the new Wills-Lee plant. E. E. Allyne, the company's president, visited Marysville last week as the guest of C. Harold Wills and completed details for the purchase of the site. Modern scientifically equipped plants will be erected.

German Commerce Shows Rapid Growth

Trade With England Nearly on Even Terms—Automobile Business Grows

LONDON, July 1 (*Special Correspondence*)—The American Chamber of Commerce in London reports that, according to official figures given in Parliament by the British Board of Trade, the total imports from Germany for the three months, February to April, were valued at over £5,500,000 sterling, whilst the principal exports from Great Britain to Germany for the same period were valued at nearly £6,000,000 sterling, of which 9 per cent represented foodstuffs, 46 per cent raw materials and 45 per cent manufactured goods.

Not only is British trade with Germany increasing rapidly, but it is interesting to note that, according to official figures, trade with the United States is also increasing. In February, 1919, German exports to the United States were valued at \$30, but in February this year they reached a value of over \$2,000,000. Imports of artificial flowers are said to be exceptionally heavy, and linen goods, gloves, cottons, toys, etc.

In commercial motor vehicles, too, Germany would appear to be regaining her pre-war trade, assisted by the rate of exchange. During a recent month imports of these goods into Great Britain numbered 718, whilst only 200 were imported from the United States.

BRITISH PRODUCTION GROWS

LONDON, June 29 (*Special Correspondence*)—At a stockholders' meeting of the Crossley Motor Co. this week it was stated that the output of Crossley 25-30 hp. cars has attained a *monthly rate of 250*, while the output of British Overlands—which are being built in a wartime aircraft factory near Manchester has already reached *30 cars a day*. As the latter business has been started but a few months, compared with the many years existence of the present Crossley business, the result is amazingly successful and a credit to the ex-Ford production manager of the Overland business.

The same meeting approved of a further raising of the stock capital, which, if successful, will more than double the \$3,000,000 capital of the parent Crossley company.

BARGES BIG DELIVERY FACTOR

NEW ORLEANS, July 20—The Automotive Sales Co. recently received the largest shipment of automobiles ever brought into New Orleans by water. It consisted of 290 Chalmers and Maxwell passenger cars and Maxwell trucks, brought from Cincinnati on six barges of the Federal waterways Mississippi river service. This shipment is valued at \$468,370, and is one of the most valuable

cargoes ever handled by the government barge service on the river.

The river steamer Oscar F. Barrett towed the barges from the Ohio port to the Flood street landing and the cars were rolled ashore directly from the barges, on their own wheels. Every car was in perfect condition when it arrived, not a part was missing, and it was stated that hereafter the majority of shipments ordered by the Automotive company would be specified to come by water, wherever possible.

Indiana Association Seeks Bank Co-operation

INDIANAPOLIS, July 17—All Indiana car and equipment dealers and all presidents of banks in the state are being reached in the matter of automobile paper with letters sent out by John B. Orman, manager of the Indianapolis Automotive Trade Association. Accompanying the letters in which Orman directs attention to the close relationship existing between the banking business and the automobile industry and the contribution of the automotive industry to the great business of the nation is a copy of the communication addressed by former Governor Stokes of New Jersey and president of the Mechanics National Bank of Trenton to the National Automobile Chamber of Commerce.

Tunnel Commission Sees Trailer Growth

NEW YORK, July 20—Semi-trailers, commonly referred to as tractor-trailers, will come into general use in the next few years, according to the prevailing opinion of the members of the Advisory Transportation Engineering Committee of the New York-New Jersey Interstate Tunnel Commission which is holding frequent meetings in this city in connection with the proposed tunnel between the two states.

The development is looked for especially as the connecting link between New York and New Jersey would tend to develop this end of the motor vehicle industry. The objective of the express, coal, milk, department store and general trucking interests is to move freight at minimum cost per ton mile and it is expected there will be a tendency on the part of the large motor truck fleet owners to establish distributing depots, to be supplied by tractor-trailers.

STEWART DEVELOPS TRAILER

WAUPACA, WIS., July 19—The Stewart Tractor Co. has developed a new type of trailer designed especially for combination with tractors and the first vehicles are now coming through the works. The Stewart trailer is built with drawbars fore and aft, so that they may be used singly or in trains. The coupling is of special design to provide automatic trailage for trains when making curves. The new trailer will be manufactured in quantities, and offered to the trade in combination with the Stewart tractor or individually.

New Zealand Offers Big Market for Cars

Tremendous Growth Seen in Imports Since Close of War—Gasoline Short

SEATTLE, July 19—From the point of view of per capita purchasing power the Dominion of New Zealand is probably the strongest market in the world for American passenger and commercial vehicles. With a population of about 1,200,000 there were nearly 25,000 motor vehicles in the country in 1919, and the end of the current year is expected to show a phenomenal gain in the total registration, as the imports of motor cars during the earlier months of 1920 have been of unusual number.

Some idea of the strength of New Zealand's purchasing power may be gained when it is ascertained from an analysis of the official trade statistics that during the year ended March 31, 1920, the Dominion imported \$150 of goods per capita, of which 25 per cent, or \$40 per capita, came from the United States. The total exports during that year were \$260,000,000, or \$260 per capita, and imports \$150,000,000.

In 1910 there were probably not more than 2000 vehicles in use in New Zealand, while at the end of 1914 there were about 11,000. As there are now about 25,000 motor cars in use, it will be seen that the greatest gain in the popularity of automobiles in the Dominion occurred during the years of the war, when American manufacturers had almost an exclusive hold on the market.

During the first four months of 1920, 4705 vehicles, mostly from the United States and Canada, were imported by New Zealand, which marks a new record.

New Zealand, like many other countries, is now feeling the shortage of production of gasoline, which threatens to retard the continued development of motor car popularity in the Dominion. With more than double the number of vehicles in use imports of gasoline are only 25 to 30 per cent heavier than five years ago.

WHARTON PLANS PRODUCTION

DALLAS, July 19—If present plans of the Wharton Motors Co. are carried out early models of this company's cars will be on demonstration here within two months, according to a statement by officials of the company. A limited number of cars are now in the course of construction in Kansas City, it is said, and delivery is promised within two months.

Work on the first unit of the \$2,500,000 plant here will begin sometime in October, and manufacture of tractors will begin at the local factory early in 1921, Thomas P. Wharton, president of the company, declares. Construction of the remaining units of the plant will be speeded up as much as possible and passenger cars will be made as soon as facilities will permit.

Exports of Automobiles for May

COUNTRIES	—Commercial—				—Passenger—				Parts
	Complete Cars		Chassis		Complete Cars		Chassis		
	Number	Dollars	Number	Dollars	Number	Dollars	Number	Dollars	
Austria	.....	.....	.....	.....	.....	.....	.....	.....	47
Azores and Madeira Islands	.....	.....	.....	.....	.....	.....	.....	.....	165
Belgium	49	85,848	.....	.....	395	420,603	6	11,079	15,520
Denmark	13	18,336	2	4,326	100	113,756	1	1,991	102,122
Finland	.....	.....	32	67,210	8	11,950	.....	.....	4,203
France	.....	.....	.....	.....	51	115,131	.....	.....	190,872
Germany	.....	.....	.....	.....	11	23,882	.....	.....	50
Gibraltar	.....	.....	.....	.....	9	8,560	.....	.....	81
Greece	7	16,556	.....	.....	33	47,086	2	6,000	15,069
Iceland and Faroe Islands	25	13,263	8	4,294	15	13,974	.....	.....	3,563
Italy	.....	.....	.....	.....	62	70,122	134	87,538	81,071
Malta, Gozo, and Cyprus Is.	.....	.....	2	990	29	25,176	6	2,970	1,458
Netherlands	9	13,765	30	23,571	258	309,625	5	8,186	15,175
Norway	30	46,157	52	79,046	389	501,781	1	500	60,390
Poland and Danzig	6	17,199	.....	.....	14	12,720	.....	.....	5,725
Portugal	5	10,726	20	17,976	37	49,722	.....	.....	25,136
Roumania	.....	.....	.....	.....	2	4,450	.....	.....	672
Russia in Europe	1	2,750	.....	.....	.....	.....	.....	.....	134
Spain	27	41,941	26	64,245	354	475,022	11	10,992	363,144
Sweden	54	107,778	37	49,432	659	761,152	16	32,675	40,250
Switzerland	2	2,000	7	3,753	161	178,195	.....	.....	11,664
Turkey in Europe	3	5,500	.....	.....	27	22,211	.....	.....	6,463
England	217	363,929	420	596,190	1903	2,181,974	143	143,002	2,608,585
Scotland	4	4,246	.....	.....	74	108,990	12	13,640	1,838
Ireland	.....	.....	.....	.....	61	68,736	.....	.....	1,151
Jugoslavia, Albania, etc.	.....	.....	.....	.....	1	2,000	.....	.....	140
Bermuda	.....	.....	.....	.....	.....	.....	.....	.....	29
British Honduras	.....	.....	1	1,271	.....	.....	.....	.....	324
Canada	151	259,176	156	334,824	1202	1,741,841	90	80,508	2,920,964
Costa Rica	3	4,630	.....	.....	12	9,781	.....	.....	989
Guatemala	.....	.....	.....	.....	11	12,629	.....	.....	10,778
Honduras	.....	.....	.....	.....	2	2,613	.....	.....	4,878
Nicaragua	.....	.....	1	550	22	18,894	.....	.....	7,279
Panama	1	1,500	8	3,960	24	20,656	.....	.....	10,023
Salvador	1	2,737	.....	.....	14	18,544	.....	.....	3,942
Mexico	45	112,049	17	42,195	102	114,563	10	4,778	49,812
Newfoundland and Labrador	.....	.....	1	3,765	15	14,637	.....	.....	3,507
Barbados	.....	.....	.....	.....	14	12,300	.....	.....	3,671
Jamaica	7	17,927	25	31,878	45	30,050	2	5,820	20,598
Trinidad and Tobago	3	4,930	15	7,425	69	56,957	.....	.....	17,220
Other British West Indies	2	3,100	1	587	26	16,830	.....	.....	4,050
Cuba	119	217,597	138	256,992	1117	897,240	6	13,479	253,953
Virgin Islands of U. S.	.....	.....	.....	.....	2	1,644	.....	.....	1,882
Dutch West Indies	1	454	2	990	5	5,365	.....	.....	1,925
French West Indies	.....	.....	1	1,572	5	3,079	.....	.....	5,256
Haiti	.....	.....	2	1,056	15	14,419	.....	.....	4,584
Dominican Republic	4	9,914	12	6,638	47	42,858	2	990	17,346
Argentina	57	109,554	28	85,076	307	365,350	5	7,302	158,075
Bolivia	.....	.....	7	3,458	6	2,681	7	10,020	4,603
Brazil	28	43,071	193	105,050	723	683,318	2	5,435	190,089
Chile	9	14,306	7	7,508	153	166,615	37	25,039	56,546
Colombia	13	7,210	3	8,276	106	136,060	2	907	16,905
Ecuador	.....	.....	.....	.....	28	35,599	.....	.....	3,264
British Guiana	.....	.....	.....	.....	12	6,425	.....	.....	4,301
Dutch Guiana	1	600	.....	.....	2	1,200	.....	.....	155
French Guiana	.....	.....	.....	.....	.....	.....	.....	.....	35
Paraguay	.....	.....	.....	.....	.....	.....	.....	.....	1,239
Peru	39	57,593	4	9,948	62	75,271	1	4,150	50,785
Uruguay	.....	.....	11	18,233	355	297,345	11	6,000	59,354
Venezuela	1	990	1	690	84	57,787	.....	.....	22,315
Aden	.....	.....	.....	.....	3	2,614	.....	.....	739
China	14	37,717	3	5,717	182	218,064	19	16,421	12,802
Kwantung, leased territory	.....	.....	.....	.....	15	17,045	.....	.....	150
Chosen	.....	.....	.....	.....	18	17,785	4	4,300	32,501
British India	65	147,640	52	123,148	852	919,347	3	7,147	96,740
Straits Settlements	36	42,181	13	23,384	272	275,547	.....	.....	75,346
Other British East Indies	2	5,433	8	21,209	29	36,563	7	6,150	9,781
Dutch East Indies	9	15,589	15	41,649	306	397,176	1	2,640	52,210
French East Indies	10	11,118	.....	.....	15	18,600	.....	.....	2,181
Hongkong	10	13,786	1	1,757	18	22,970	.....	.....	6,712
Japan	20	49,775	326	296,915	312	281,063	55	63,409	54,282
Persia	.....	.....	.....	.....	.....	.....	.....	.....	986
Siam	.....	.....	.....	.....	6	5,461	.....	.....	1,405
Turkey in Asia	1	740	10	4,537	138	93,346	14	11,093	5,106
Australia	4	5,061	62	71,238	221	252,208	633	668,354	134,188
New Zeala	6	11,704	7	17,887	184	237,108	4	4,154	75,561
Other British Oceania	.....	.....	.....	.....	1	1,300	.....	.....	330
Oceania	.....	.....	.....	.....	1	750	.....	.....	1,613
Philippine Islands	122	116,870	18	39,515	211	200,716	62	37,334	90,414
Belgian Congo	.....	.....	.....	.....	.....	.....	.....	.....	444
Br. West Africa	22	26,028	32	41,238	102	81,602	46	61,969	20,627
Br. South Africa	12	27,402	4	6,474	1064	1,194,066	.....	.....	184,804
British East Africa	.....	.....	.....	.....	47	55,319	2	2,520	1,853
Cape Islands	.....	.....	.....	.....	25	29,313	.....	.....	992
French Africa	10	5,494	53	158,126	76	40,867	.....	.....	25,371
C. run, etc.	.....	.....	.....	.....	.....	.....	.....	.....	1,008
Madagascar	.....	.....	.....	.....	1	1,205	.....	.....	379
Mozambique	13	9,083	6	2,920	81	60,712	2	3,800	3,150
Portuguese Africa	8	4,624	.....	.....	31	27,606	.....	.....	15,445
Egypt	.....	.....	13	11,760	169	181,879	6	2,351	8,280
Total	1301	2,147,577	1893	2,710,449	13620	15,059,601	1370	1,374,643	8,380,764

NEWS BULLETINS BY WIRE

DETROIT, July 22—Inability to obtain an adequate supply of parts and materials has forced the Commerce Motor Car Co., manufacturer of Commerce trucks, to close its machine shop, chassis and frame divisions, until Aug. 15. C. M. Granger, production manager, says transportation difficulties have made it impossible to keep the assembly plant on a production basis in line with the other departments. He declared emphatically that neither slowing up in demand nor financial stringency had anything to do with the shut-down order. The assembly division is running at top speed and will continue to do so until it has caught up with the other divisions. At that time the entire plant will be re-opened.

Reports that the Federal Motor Truck Co. has closed its plant are unfounded and officers said no such action was contemplated.

GERMANS SEEK HOME TRADE

WASHINGTON, July 22—Information concerning the combination of small German automotive manufacturers in an effort to forestall an increased importation of American cars and trucks into that country has been received by the Department of Commerce from the American Commission in Berlin. Under the consolidation agreement the small manufacturers have made provision for the retention of the special features in their cars. The chief benefits they will derive from the combination are a general purchasing agency for raw materials and a clearing house for labor. German manufacturers do not expect that American automobile makers will make a strong bid for German trade this year, because of the economic situation in the latter country. Under the existing conditions Germany cannot absorb more than 30,000 vehicles a year.

MUNCIE PRODUCTS TO START

MUNCIE, IND., July 20—The new plant of the Muncie Products Co., General Motors Corp. subsidiary, will be in operation in about a month. Chassis parts, transmissions and steering gears for the Chevrolet car will be the principal product of the plant, though it is planned also to make parts for the Sheridan, the new General Motors car, which is to be manufactured at Muncie. A force of about 700 men will be employed under a factory organization now being formed.

FRANKLIN PLANS BARGE LINE

SYRACUSE, N. Y., June 22—So successful was a canal shipment of Franklin bodies from Buffalo to Syracuse that the Franklin Automobile Co. is considering installing a barge service of its own with two large barges and a steamer in operation. It is planned to have the barges carry bodies and the steamer miscellaneous merchandise, originating at Buf-

falo and from Cleveland and Detroit in connection with the boat lines to Buffalo.

These plans follow an initial shipment made a short time ago by the company in which the bodies were shipped by way of the New York barge canal arriving at their destination in excellent condition and which proved satisfactory to the shipper in every respect.

DEALERS COMPLAIN TO HARDING

WASHINGTON, July 22—The statement was made to-day at the offices of the Federal Reserve Board that communications have been received from many automobile dealers calling attention to the serious injury they are suffering because individual bankers refuse to grant them credit. In reply to them Governor Harding has reiterated that no express conditions have been laid down regarding the essential or non-essential character of loans. He contends that this is so much a question of local conditions and local knowledge that no general regulations would be justified "at this time, even if such a ruling were deemed helpful."

MORE CARS FOR GRAIN

WASHINGTON, July 22—Further tightening of the transportation situation so far as general manufacturing is concerned, is expected to result from an order issued to-day by the Commission on Car Service directing that an additional 25,500 serviceable box cars shall be moved from eastern and southeastern roads to western lines, beginning Sunday, to move grain. It will be of ultimate benefit, however, for prompt movement of crops will bring a general loosening of credit. Another order of the commission will help automobile shippers, for under it open top cars returning to the mines may be available for shipments into mining territory.

DETROIT PLANTS LOSE POWER

DETROIT, July 22—The Detroit Edison Co. notified automobile factories to-day that effective Monday their power supply would be cut 50 per cent. Repairs to machinery which will permit a full load will not be completed before Oct. 1. Unless the order is complied with all power will be cut off. The suggestion is made that night and day shifts be operated but it is stipulated that night work shall not begin before 10 o'clock. Many companies are completing their fiscal years and may take advantage of the opportunity to close down for inventories. Dodge and Ford have their own power plants.

MAXWELL-CHALMERS CLOSED

DETROIT, July 22—The Maxwell and Chalmers plants in this city have shut down. It is announced that it is for inventory.

Antiquated Planes Are Already Here

Difficulty Expected in Determining Owners—To Start Injunction Suits

NEW YORK, July 20—Notwithstanding the decision of Federal Judge Chatfield, reported last week, that foreign airplanes which infringe American patents cannot be sold in this country, it has been learned that a large number of the antiquated British war planes, purchased by the Handley Page to be dumped in the United States, already have arrived here. They were passed last week by the Treasury Department, which had no alternative but to permit their entry after the duty had been paid, as Congress did not enact the hoped for anti-dumping legislation.

It already is evident that difficulty will be experienced in enforcing Judge Chatfield's decree, for American manufacturers have not been able as yet to determine the ownership of the machines in a legal sense. They were consigned to an importing house. The Aircraft Sales Corp., which was formed by Handley Page to dispose of the surplus British planes, has not been incorporated in this country.

Under the circumstances it seems likely that the only legal proceeding possible will be to seek an injunction every time one of the planes is sold.

The legal proceedings instituted by the Wright Aeronautical Corp. against the Interallied Aircraft Corp., in which Judge Chatfield's decision was made, was not designed to prevent the importation of aircraft manufactured abroad since the close of the war. The license fee for the use of the Wright patents would represent only a small part of the sales price of a new machine and would not lessen the sales aggressiveness of foreign makers seeking an American market.

Sales Fee Cuts Profits

In the case of the war planes bought by Handley Page, however, a license fee of \$300 would cut deeply into the profits, for the planes must be sold very cheaply if they are to find a market here. It was hoped that the patent rights of the Wrights were firmly established, it would prove a deterring influence, but with the planes already in the country and no central agency found against which legal action can be brought, the outcome remains in doubt.

The Wrights announced this week that the Interallied Aircraft Corp. had entered into an agreement with them under which all the Avro and Sopwith planes it is selling are licensed under the Wright patent. This protects purchasers from danger of any legal difficulties. In the case of purchasers of the dumped Handley Page machines, however, there is a strong probability that they will be involved in a court action.

Manufacturers to Help Dealers

Obligations Shown at Buffalo Meeting

Propose Firms With Reserves Take Dealers' Notes—Suggest Finance Companies

NEW YORK, July 20—Ways and means of helping automobile dealers finance themselves during the credit stringency were discussed by the directors of the National Automobile Chamber of Commerce, at a meeting at Buffalo, and practical methods were worked out to ease the burden which is pressing heavily upon the retailers. The manufacturers frankly admitted that they owe an obligation to their dealers, and they expressed an earnest desire to help in every way possible. The suggestion had been made that companies with ample cash reserves could use the money to no better advantage than to turn it over to reputable dealers in exchange for notes.

Discussion brought out the fact, however, that there are only a handful of companies in this fortunate position. Most of the car makers, handicapped by unbalanced inventories, are having troubles of their own getting the bank credit they need to swing their business and the dealers can look for little actual cash help from them. It is not unlikely, however, that the companies well supplied with cash will devise means to assist their dealers.

The General Motors Corp. is doing this by means of its acceptance corporation, and others may take up some similar plan. There are other means of loosening up credit, also. The plan of using certificates of deposit issued upon loans, without any withdrawal of real cash from the banks, has met with widespread approval. These certificates usually are issued, however, only to dealers entitled to credit.

Seek Private Financing

Another method which is meeting with favor is to obtain lists of residents in each town who have money to loan and induce them to finance automobile paper. The notes they accept are guaranteed by the dealers, and they also have the motor vehicles as security.

Reports received showed that sales of cars priced above \$1,500 are holding up amazingly well. There has been a falling off in the demand for trucks in the last 30 days, however, although dealers are meeting with fairly good success in financing their sales.

While credit is easing up, the most serious problem the industry has to face is that of transportation. Manufacturers are meeting with fair success in

getting supplies to their factories, but there is a woeful shortage of cars to ship out the finished product. Production reports for June showed that 22,000 carloads of automobiles were shipped from the factories, while 75,000 cars were driven away. The figures were virtually the same as for May, and means that half the motor cars made in the country were sent away under their own power. It was agreed that drive-aways will be the rule for the rest of the year.

Gasoline Reports Encourage

Encouraging reports were received regarding the gasoline situation. It was not believed the fuel situation will become so serious as to cause alarm. Reserve stocks are increasing and considerable progress is being made in drilling operations. Gasoline reserves at the end of April aggregated 643,552,644 gal., as compared with 593,616,170 at the end of April, 1919.

The directors decided to enter into a co-operative relationship with the Association of Railway Executives with the purpose of being helpful to the carriers. Though suffering sadly from the shortage of transportation, automobile makers have a keen realization of the necessity of rehabilitating the railroads and are anxious to help in the gigantic task. For that reason encouragement will be given the establishment of motor truck lines which would serve as feeders to the carriers, especially the short lines which are most in need of business.

Col. Charles Clifton, president of the Chamber, and Alfred Reeves, general manager, were authorized to co-operate in every way with the National Automobile Dealers Association for the good of the industry.

Directors present at the meeting were Col. Clifton, C. C. Hanch, R. D. Chapin, J. Walter Drake, A. J. Brosseau, Horace E. Dodge, H. H. Rice, William E. Metzger, and Alvin Macauley. Others at the session besides Reeves were Thomas Henderson and F. J. Haynes.

R. & V. FOUR NEARS MARKET

DETROIT, July 19—R. and V. Knight four soon will be lined up alongside the six, according to information reaching Thomas H. Walker, general manager of Knight Motors, Inc., from the factory of the Root & Vandervoort Engineering Company, Moline, Ill. Production of the four has been delayed on account of the demand for sixes and deliveries of the four are expected by Sept. 1. The lines of the "little brother" to the six will follow closely those of the larger car. Specifications provide for many features embodied in the big car.

Kansas City Ban Probable for Year

Restriction on Passenger Cars Continues Unabated — Car Shortage Helpful Says Official

KANSAS CITY, July 20—The ban of the Kansas City Federal Reserve Bank on all passenger car paper will probably not be lifted for twelve months according to Asa Ramsey, chairman of the board. This restriction has been made necessary by the pressing need of member banks for loans to finance the present wheat harvest in the Southwest. Following the wheat harvest will come the cotton and corn crops needing all available credit in the district. The utmost conservation of financial resources in this district is necessary to care for these crops and what the bankers term the essential industries.

Tightness of credit is due to the economic tendencies of the people to extravagant expenditure, in a large measure, according to Ramsey. Though loans in this district are still strong there is hope in the graduated scale of rediscounts adopted by the bank recently which has distributed the loans over a greater number of banks, relieving the strain on the reserve city bankers.

Tractor and truck paper is being taken by the Kansas City Federal Reserve Bank at 7 per cent. Passenger car paper will not be accepted in any form being classed with jewelry and music paper. When asked if a dealer desiring to finance a bus line for transportation purposes only would receive rediscount at the bank, Ramsey said no allowance would be made.

In commenting upon the action of the Chicago and the Cleveland Federal Reserve Banks in accepting passenger car notes for rediscount, Ramsey stated that the situation in the Kansas City district was very dissimilar to the conditions in Chicago and Cleveland. The pressing needs of the harvest so apparent here are not felt in the Eastern cities where manufacturing predominates.

The shortage of cars here which continues unabated is considered beneficial by Ramsey in that the slow movement of wheat prevents an excess of money.

FARM TOOLS AT SEDALIA

KANSAS CITY, July 19—A varied exposition of power farming implements and tractors will be arranged by the Kansas City Tractor Club as a feature of the Missouri State Fair at Sedalia, Mo., Aug. 9 to 14. According to the plans of the club the exposition will be more extensive than any of the former annual fairs.

Gas Shortage Real, Secretary Finds

Reports of Manipulation for Higher Prices Are Fictitious California Probe Shows

OAKLAND, CAL., July 19—After an exhaustive investigation of the gasoline shortage in this State, Robert W. Martland, secretary of the California Automobile Trade Association, declares he has found no evidence to substantiate the statements made at the annual meeting of the association on June 5 that the shortage was a fictitious one. Instead he found that there is a natural shortage of gasoline.

Optimistic views of a return to normal conditions within thirty days prevail in many quarters, and it is felt that there will be no shortage of gasoline next year. It is expected the fuel shortage will experience its greatest relief through new cracking processes now being installed which extract more gasoline from the crude and through the leasing of oil lands which were withdrawn from entry eleven years ago.

The investigation by Martland was carried on in co-operation with the Department of Justice and the findings have been furnished to E. N. Blanford, chief of the Bureau of Investigation.

"Statements were made that wells were capped and that production was being withheld," Martland said in referring to the annual meeting. "Upon investigation it was found that seven wells were capped by the order of the gas and oil supervisor of the State Mining Bureau, which made it compulsory on the part of the oil companies. The reason for capping was that thousands of cubic feet of natural gas per hour were being wasted; consequently the wells were capped until the proper facilities could be installed for handling."

Martland found that statements made that in communities where the oil companies had small distributing plants, tanks were full of gasoline and carloads of gasoline were remaining on the tracks while demurrage was being paid, had some basis.

"For instance," the report states, "a carload of gasoline would be sent to a given point in accordance with the allotment provisions; in some instances upon arrival the storage tanks were not sufficiently empty to receive the entire contents of the car, with the result that in some cases it would be two or three days before the contents of the car could be loaded into storage tanks."

NAVY ORDERS METAL PLANES

DETROIT, July 16—William B. Stout, technical adviser to the aircraft board during the war and former chief engineer of the aircraft division of the Packard Motor Car Co., has been awarded a contract by the United States navy department for six all-metal airplanes of a type never before attempted in this country.

The action of the government is said to have been hastened by the successful performances in America of the German Junkers model, similar to the one designed by Stout and which made a non-stop flight from Omaha to Philadelphia.

The capacity of the planes ordered from the Stout Engineering Laboratories has not been announced. The German airplane carries six passengers. Like the German plane the Stout type will dispense with the external bracing of struts and wires and inflammable woods, taking their strength from internal braces.

Would Regulate Gasoline Distribution

POMONA, CAL., July 19—A. V. Storer, secretary of the Citrus Belt Automotive Trades Association, is sending letters to all members embodying his views on the subject of placing gasoline under commission supervision.

"No country in the world today," he says, "is so motorized and so dependent upon gasoline as is the United States, and if self-preservation is the first law, then the distribution, either without or within our borders, of this so necessary a commodity, should be in the hands of commissions with powers to regulate its sales and profits."

Trucks Find Markets in Mexican Oil Fields

TAMPICO, MEXICO, July 20—Motor trucks are coming into general use for the transportation of supplies and materials to the oil fields of the Gulf Coast region of Mexico. Practically all of the oil companies have fleets of motor trucks which are kept constantly in use. The rapid development of the oil industry keeps up the demand for additional transportation facilities of this kind and the demand is stimulated by the construction of good roads. Only recently a local dealer arranged for the immediate shipment of 52 motor trucks direct from the factory in the United States to Tampico, and he also placed an order for the delivery here of 20 trucks a month hereafter, the contract to run for an indefinite period.

Many motor trucks are also being shipped into Mexico at this time through the border gateway of Laredo, Brownsville, Eagle Pass and El Paso. They are being more and more used by mining companies and industrial enterprises.

M. A. M. A. OFFICERS SAIL

NEW YORK, July 21—Charles E. Thompson, president of the Motor and Accessories Manufacturers Association, and M. E. Heminway, general manager, who attended the organization meeting of the International Chamber of Commerce at Paris and investigated automotive conditions in Europe, sailed for home to-day on the steamship Olympic.

Stock Buying Links G. M. C. and Dunlop

Holdings of British Companies Show Intimacy Between Two Organizations

NEW YORK, July 20—Intimate association between the General Motors Corp. and the American Dunlop Co., which is now completing a huge tire factory at Buffalo, has been brought about through the recent purchase by Explosives Trades, Ltd., of London, of \$25,000,000 worth of General Motors stock. Close business relationships had previously been established between Explosives, Ltd., and the duPont Co. industries of America, which controls the duPonts 27 per cent stock holdings in General Motors.

After the armistice, Explosives, Ltd., decided to enter the transportation field. Its first step was to acquire substantial holdings in the Dunlop Rubber Co. of England, the leading tire company in that country. This was followed by the purchase of large holdings in the Tire Investment Trust Co., which controls the Dunlop Rubber Goods Co. of Canada and the Dunlop Far East. The logical development was acquisition of a big interest in the American Dunlop Co., which expects to get into production in a few months.

Other companies in the automotive field in which Explosives, Ltd., has large holdings include John Marston, Ltd., of Wolverhampton, makers of Sunbeam bicycles and motorcycles, the Rotax Motor Accessories Co. of London, Kynock, Ltd., manufacturers of bicycles and motorcycles, and the British Pluviusin Co. of Manchester, which makes artificial leather used in the upholstering of automobile bodies. Its General Motors holdings constitute only about 2½ per cent of the total capital of the American company, but it is sufficient to establish close connections between them.

It is intimated that when the directorate of the American Dunlop Co. is announced it will be found to be more or less interlocking with that of General Motors.

To Enter British Field

Sir Harry McGowan, managing director of Explosives, Ltd., after a personal investigation of the General Motors factories, was deeply impressed with their quantity production methods, and is firmly convinced that they can be adopted in England on a somewhat modified scale. It is an open secret that General Motors proposes eventually to enter the British field, with factories in England, which will be the center for the development of the industry in that country and which will be modeled after those now in operation in this country. When this time comes, its alliance with Explosives, Ltd., will put it in much the same position in England that it now occupies in this country.

Bethlehem Motors to Foster Bus Lines

Interests Allied with Company to Develop Nationwide Sale and Operation

NEW YORK, July 22—Interests closely affiliated with the Bethlehem Motors Corp., Allentown, Pa., are preparing for the formation of a company which will be devoted to fostering the use of motor buses throughout the country. Details of the organization and its scope have not been worked out but an announcement concerning them is expected soon. It is probable the new corporation will be a subsidiary of Bethlehem Motors to all intents.

It is expected a plant will be acquired or erected for the building of bus bodies when the company gets fully under way. Production of buses already has been begun by the Bethlehem company on a small scale and its present factory facilities are being used for this purpose. The additional work has been made possible by enlargements to the plant, although the production of trucks has been increased.

Engineers are working on the design of the bus bodies and every effort will be made to produce vehicles which will be well adapted to passenger transportation under all conditions. A new chassis which is said to embody several new features is being designed.

Not only will the company turn out buses but it will co-operate actively in their operation. Experts will study the different fields and will provide accurate cost statements so that purchasers will not begin their operations by guess but will have cold facts upon which to base their transportation.

Field representatives already have been sent out to look over the situation. They will map out bus lines in cities and in rural districts and the vehicles will be sold either singly or in fleets.

Waukesha Iron Reopens Under New Control

WAUKESHA, WIS., July 19—The Waukesha Malleable Iron Co., which on July 1 was taken over by the General Motors Corp., has resumed production after a brief recess for inventories and otherwise facilitating the transfer. The output of malleable castings will go mainly to the Samson Tractor Co. at Janesville, Wis., although the Waukesha foundry will serve also the Buick Motor Co., Flint, Mich.

James A. Craig, president and general manager of the Samson Tractor Co., with headquarters at Janesville, will exercise general direction of the Waukesha foundry. John Enders, secretary of the Waukesha company under the former ownership, is retained as resident manager, and John E. Haertel continues as works manager. A. J. Baldwin, formerly in charge of laboratory work, is given

supervision of maintenance and construction.

Important enlargement of the works is contemplated as soon as conditions become favorable to construction and equipment projects. In the meantime, the working force at Waukesha, numbering about 225 operatives, will be increased as rapidly as possible to the point where the maximum capacity of the present buildings and equipment is reached.

Advertising Council to Aid in Campaign

BEDFORD SPRINGS HOTEL, PA., July 17—The advertising managers' council of the Motor and Accessory Manufacturers' Association, which met here this week, has instructed its executive committee to consult with the National Automobile Chamber of Commerce, Society of Automotive Engineers, National Automobile Dealers Association and other organizations engaged in automotive advertising to undertake a campaign to present the stability and essential character of the industry to the American people. Some of the advertising men present offered the space at their disposal for this purpose for a considerable period of time.

It was the expressed belief of the advertising men that much could be accomplished along this line by a properly assembled set of motion pictures and that certainly a considerable help could be given by closer attention to utility, rather than sport, illustrations in advertising the completed vehicles.

There were more than 20 advertising men present and there was a very wide discussion of all subjects presented to the council. E. C. Tibbitts presided, and M. Lincoln Schuster, assistant to General Manager Heminway, represented the M. A. M. A.

U. S. BUILDS 6-TON TRUCK

CINCINNATI, July 19—The United States Motor Truck Co. has begun the production of its new 6-ton truck which is equipped with the concern's own engine. The truck has three sets of brakes, two internal expanding and one emergency brake back of the transmission on the driving shaft. In a recent test it was brought to a full stop from full speed within 75 feet. In appearance it is similar to the army trucks. It is equipped with the United States Motor Truck's standard special design and has a heavy pressed steel frame.

PHILADELPHIA RUBBER BUILDS

BUFFALO, July 19—Development of the property acquired by the Philadelphia Rubber Works Co., of Akron and New York, in connection with its plant located here is rapidly being made. Through active local co-operation the company was able to secure 100 acres adjoining the works of the Dunlop American, Ltd., with a large frontage on the river. Railroad connections have been effected and a pipe line has been laid.

Theft Plot to Test Dyer Law Operation

Location of \$500,000 in Stolen Cars in Washington Discloses Widespread Violation

WASHINGTON, July 21—Discovery of a gigantic plot to swindle automobile dealers and garage owners of the country by sales of stolen automobiles has aroused wide-spread interest in what is regarded as the first real test of the recently enacted Dyer Law. Washington and New York detectives uncovered thefts which are valued at \$500,000 in tracing down the sales of high-priced cars to dealers in this vicinity at low prices. Automobile dealers along the Atlantic Coast, particularly in New York, Baltimore, Newark and Philadelphia, have been summoned to testify before the grand jury here.

The police seized seven certified drafts for \$1,750 each from Albert McIlveen, automobile dealer, of this city. These drafts will be used as evidence in the police round-up now under way. Because of the developments local dealers, especially garage owners, have been inconvenienced by detectives in examining all cars and parts on the premises. The controversy over ownership of cars continues to grow as owners from various near-by cities arrive to identify their property.

The police say that the secret number placed in the late models by manufacturers has proved of inestimable value in the determination of the rightful owner. It is evident the thieves employed skillful mechanics to obliterate identification marks which owners or manufacturers had placed on the automobiles. For this reason the authorities are giving special attention to examination of used parts in garage store-rooms. Within a week, thirty-five automobiles reported stolen in New York have been restored to owners. The police say Ford sedans of the 1919 and 1920 models were favorites in thefts.

Operations Cleverly Planned

Dealers throughout the district anticipate expensive legal proceedings over the ownership of the cars. Judging from the police reports, the organized thieves adopted clever methods to allay the dealers and garage owners' suspicions as to ownership whenever these cars were offered for sale. Certificates of ownership and bills of sale were produced when the car was delivered. These afterward were found to be forgeries. The fact that dealers have these alleged bills of sale on hand, is expected to be a source of legal proceedings. Dealers who have been swindled told the police that the cars were purchased from Morris Elias, proprietor of the Lincoln Automobile Exchange of Newark, N. J. Elias is now out on \$10,000 bail to appear before the grand jury Aug. 20 to answer a charge of violating the Dyer Act.

INDUSTRIAL NOTES

Acme Motor Parts Corp., Milwaukee, is planning to erect a new machine shop and factory and increase its production of present lines as well as add several new products. It was established last September with four employees and now has a force of 50. It specializes in magneto couplings, generator linkage, special tools, dies and jigs, and is preparing to put on the market a new type of universal joint for passenger and commercial cars. The company is capitalized at \$100,000 and its officers are: President, W. S. Smulski; vice-president, A. J. Wisniewski; secretary, F. P. Krukar, and treasurer, Stanley Polus.

New York Air Brake Co., Watertown, N. Y., manufacturer of air brakes for railway cars and of the Three Point truck, will not engage in the manufacturing and marketing of a tractor which was designed by the company and with which experiments have been made, the reason being that demands for air brakes since the close of the war being too pressing to admit of its manufacture at this time.

Eagle Motor Truck Corp., St. Louis, has purchased property for the erection of a \$50,000 addition to its plant, the enlargement being made necessary through contracts with an exporting firm for 500 trucks and in order that the increasing demands of the business might be taken care of.

Elwood Machine & Tool Co. has been organized in Detroit for the manufacture of dies, tools, jigs and fixtures, with special machine work. W. T. Elliott is president and general manager; W. D. Meddler, vice-president; W. H. Wood, secretary and treasurer.

Ideal Body Co., Madison, Wis., has been organized to manufacture open and closed passenger car bodies, truck bodies, cabs, etc. The building formerly occupied by the Fox Motor Sales Co. at Madison has been equipped for quantity production of bodies.

Motor Truck Manufacturers' Association is considering the advisability of removing its headquarters from Chicago to Akron. David Thomas, general manager of the organization, has been in Akron looking over the field for suitable quarters.

Federal Rubber Co., Cudahy, a suburb of Milwaukee, expects to occupy on Oct. 1 a new \$1,000,000 factory addition, six stories and basement, 163 x 221 ft. This will enlarge the floor space by more than 200,000 sq. ft.

Hess Mercury Carburetor Co., Valparaiso, Ind., is making extensive enlargements of its plant, the financing of which is being accomplished through the sale of treasury stock of the company.

Haynes Automobile Co., New York, has closed its export office at 17 Battery Place and has announced that all export matters will be handled through its office at 1715 Broadway.

Surety Tire & Rubber Co., St. Louis, will erect a new plant for the manufacture of cord tires.

IMPORTED TACHOMETER

NEW YORK, July 19—C. H. Boulton, 82 Duane Street, New York, imports a tachometer of French manufacture known as the Hasler. This instrument indicates directly speeds of revolution up to 10,000 r.p.m., as well as linear and circumferential speeds from 1 to 1,000 yds. per min. The instrument is direct indicating and does

not require time measurements by means of a watch. One measurement can be made in about 3 sec. time. It operates in any position, in both directions of rotation, and is said not to be influenced by external forces. Only one operation per reading is required and measurements taken in succession are automatically added. The complete instrument weighs less than 10 ounces.

Detroit Steel Products
Increases Spring Plant

DETROIT, July 17—When additions to its motor spring department are completed, the Detroit Steel Products Co. will be the largest motor leaf spring manufacturing concern in the world. With a capacity of 1,920,000 springs a year the new spring shop will turn out enough springs to equip 45,000 cars and trucks a month. The plant will be able to produce 3000 tons of springs a month, an increase of 1000 tons over present production.

Included in the additions is a forge shop equipped throughout with the latest designed spring making machinery, an example of which is a new spring forming machine that forms, quenches and hardens the leaf in a single operation and makes an eight-leaf spring in each revolution requiring one minute. There are also steel storage bins, 242 x 65 feet, with a storage space of 20,000 tons of steel. Steel will be unloaded directly from the cars by means of 10-ton electric cranes that will transport it to the storage bins and forge shops.

Automotive Corporation
to Open Tractor Plant

TOLEDO, July 19—Beginning of manufacturing operations of the Automotive Corp. will be marked by the formal opening of the first unit of its new factory at East Toledo on July 17. The building, which is modern in every detail, is a manufacturing plant in itself and is the first section of what will be one of the largest and most modern tractor manufacturing plants in the world.

Arrangements have been made to provide a day of features of a social and educational nature. Practical field demonstrations will be conducted with several tractors showing their operation with various farm implements. Every stage of farm tractor construction, by progressive assembly, will be shown and completed tractors will be at work on the grounds.

There will be moving pictures demonstrating the tractor tilling, planting, harvesting, doing belt work and a variety of work about the farm.

BOSCH TO SIGN SALES LINE

NEW YORK, July 21—If negotiations now being carried on go through, the American Bosch Magneto Co. will become selling agent under a long term contract for a number of automotive products of Gray & Davis Co.

METAL MARKETS

FURTHER boosts in prices have been resorted to in some departments of the iron and steel market in the obviously vain hope of remedying the ills of the situation. Consumers, however, realize that a \$1 advance per ton in steel making irons and higher quotations by individual producers of finished and semi-finished steel fail utterly in providing additional rail transportation equipment. As it is lack of suitable freight cars where the shoe pinches, higher quotations fail utterly in rectifying the situation and consumers are unresponsive. The iron and steel industry, in general, is beginning to complain of a curtailment of buying by manufacturers of higher priced automobiles while builders of cheaper cars are said to continue specifying against previously placed contracts at about the previous rate. More activity is looked for by way of demand from tractor builders in August. Acquisition by the General Motors Corp., of the Waukesha Malleable Iron Co., so as to insure a full supply of malleable castings for the Samson tractor plant, and purchase of the Detroit, Toledo and Ironton railroad by the Fords, in order to make certain of a non-confiscable coal supply, are signs that cause the iron and steel interests to feel rather uneasy because they interpret them as portending a steadily growing process of integration in the automotive industries.

Pig Iron—From Buffalo come reports that 4,000 tons of foundry iron have been contracted for, shipments to be made in the first quarter of 1921, the base price of \$45 for No. 2 plain applying. It is said that inquiries for 10,000 tons for first half 1921 delivery are in the market. The base for foundry remains at \$45. Basic is generally quoted \$1 higher at \$46. Many consumers are holding off buying until the Labor Board's announcement with reference to the advance in the railroad operatives' wages has had an opportunity to be reflected in transportation conditions, which are expected to ease off then, causing a likewise easier tendency in pig iron.

Steel—Automotive interests are devoting their energy to enforcing deliveries of semi-finished material on their old contracts and not bothering much about placing new business. Re-rolling billets have been sold to a Detroit automobile builder at \$65, Pittsburgh. Sheet bars have sold at \$70. Some automotive parts manufacturers have asked for postponement of shipments. Buying of bolts and nuts by passenger automobile interests in Pittsburgh is dwindling. A French automobile manufacturer is reported to have inquired in the New York market for 50 tons of high-speed tool steel.

Aluminum—Demand from passenger car builders is reported to be somewhat less insistent. As there is a good demand from other industries, the market continues steady and no radical changes are looked for.

Lead—For small spot tonnages as high as 9c., New York, has been paid, but with the A. S. & R. Co. continuing to quote 8c., New York, maintenance of such a level in the outside market is problematical.

Brass—Mills are still behind with their orders from automotive parts makers and from builders. Gradually the labor situation is growing better, however.

Tin—There is talk of a minimum selling price being decreed by the Federated Malay States smelters. The market, however, is none too strong and the outlook unsettled.

Antimony—Considerable metal is arriving and the market is easy at from 7½c., upwards.

Copper—In spite of the improved tone, there remains a large unabsorbed tonnage hanging over the market.

FINANCIAL NOTES

New Castle Rubber Co., in business for eight months, shows an increase in production from 400 tires to 1200 tires per day and the manufacture of 2000 tubes per day. Sales for the first six months of 1920 aggregated \$2,000,000, and for June \$510,000. To take care of the growth in business the capital stock has been increased to \$3,500,000 common and \$500,000 preferred.

Calumet Motor Co., Houghton, Mich., has been organized with a capitalization of \$100,000 for the manufacture of fractional horsepower motors. The plant will be located at Lake Linden or Calumet and is expected to be in operation within ninety days. Men identified with the iron and copper industries are interested in the organization.

E. G. Hodges Co., Milwaukee, has been incorporated with a capital stock of \$150,000 to engage in the general engineering and machinery business, specializing in automotive parts, accessories and supplies. The incorporators are Edward G. Hodges, Fred J. Chlupp, Dan F. Breslauer and Hugo Schatt-schneider, all of Milwaukee.

American Bosch Magneto Corp. for the five months ended May 31 shows net profits after reserves for 1920 Federal taxes of \$702,863. If negotiations now being carried on are concluded satisfactorily the corporation will be selling agent under a long term contract for the automotive products of Gray & Davis Co.

Elgin Motor Car Corp., of Chicago has disbursed 5 per cent cash dividend for the quarter ending June 30. The receipts of the corporation for the first three months of the year were \$2,618,033.20 with a profit of \$266,388.58, an average of 37 per cent per annum on the outstanding stock.

Lincoln Motor Co. has applied to the New York Stock Exchange to list \$8,000,000 B stock. The company has declared a dividend of \$1.25 a share on class A stock out of its surplus. The dividend is payable July 30.

Electric Storage Battery Co. stockholders have approved an increase in authorized capitalization from \$18,000,000 to \$30,000,000, preparatory to making a 20 per cent allotment available to subscriptions at par.

North East Electric Co., Rochester, manufacturers of automobile starters and other supplies has increased its capital stock from \$3,000,000 to \$6,000,000 to provide for several new buildings.

Times Square Auto Supply Co., in its report for the six months ended June 30 shows net profits after deducting expenses and federal taxes of \$311,142.

Mullins Body Co. has declared a quarterly dividend of one dollar a share on common and two dollars a share on preferred, payable Aug. 1.

Willys-Overland Co. has declared a regular quarterly dividend of 25 cents per share on its common stock, payable Aug. 2.

Nash Motors Co. has declared a dividend of \$6 per share on its common stock payable Aug. 2.

Allen Motors Seeks Reorganization Fund

COLUMBUS, July 19—Stockholders and creditors of the Allen Motor Co. have received from Cleveland creditors a plan of reorganization, which is now being seriously considered. The creditors' committee consisting of R. E. Wolcott,

W. J. Corwin and J. D. Sutherland, formulated the plan. This committee reports that an appraisal of the assets of the company was made independent of the receivers and that the quick assets equal the liabilities.

All of the assets, including plant, real estate, machinery and stock on hand, is valued at \$1,200,000, according to this appraisal. The committee is of the opinion that the assets are being jeopardized by operation under a receivership. The creditors' committee suggests that the stockholders loan the company \$500,000 for at least a year to take care of pressing claims and raise the receivership. Samuel L. McCune of Cleveland is suggested as syndicate manager under orders to report within 30 days the success or failure of the plan to raise \$500,000 as a loan to the company.

United States Rubber Finances Extensions

NEW YORK, July 19—The United States Rubber Co. has sold to Kuhn, Loeb & Co. \$20,000,000 ten-year 7½ per cent notes, secured by \$25,000,000 6 per cent bonds issued under the rubber company's first and refunding mortgage of Jan. 2, 1917. Kuhn, Loeb & Co. is organizing a banking syndicate for the flotation of these notes. The offering price to the public is expected to be around par.

The Board of Directors of the United States Rubber Co. issued a statement, which said, in part:

"Owing to the present time being unfavorable for the placing of long term bonds on advantageous terms, the directors felt that it was in the interests of the company to borrow upon the bonds for a shorter period of time rather than to sell them under existing conditions, and therefore the \$20,000,000 of ten-year notes, with the bonds as collateral, were issued. The bonds themselves run for thirty years from Jan. 2, 1917."

In the official statement issued by the company it was said that the proceeds of the sale of the new notes, with the current surplus earnings, will give the company sufficient funds for the completion of the plant extensions now in progress at Detroit, Hartford, Providence and Indianapolis, for the increase in the company's tire production, which is said to be far below the demand.

JACQUET TO STAY IN BELDING

DETROIT, July 20—L. W. Wilson, vice-president and general manager of the Jacquet Motors Corp. of America, has issued a formal denial of the report that the plant of the company would be moved from Belding, Mich., to Manitowac, Wis., or any other town. He asserts the report was circulated by Alfred J. Jackson, former president of the company, who was "dismissed" by the directors.

The citizens of Belding subscribed a fund of \$30,000 to induce the Jacquet company to locate there. The car is not yet in production but Wilson reports that it will be on the market Jan. 1.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, July 22—The effect upon the earnings and credit of the railroads of the award by the Railway Labor Board of wage increases amounting to approximately \$600,000,000 annually, will depend upon the extent and distribution of the expected increases in rates. It may be hoped that, if the award is accepted by the companies and the employees, the increased wages will result in reducing the unrest among the workers and in improved efficiency in the personnel of the operating forces.

Increased efforts to speed the movement of freight cars throughout the country are reported. This is fortunate. No single factor may be expected to bring about an easing of the credit strain in greater degree than general and sustained improvement in the working of our railroads.

The ruling call loan rate, 8 per cent, was somewhat higher than the prevailing rate of the week before. With heavy Government withdrawals of deposits on Thursday, the rate rose to a maximum of 11 per cent, against a maximum of 10 per cent in the previous week. Almost no time money was available, and nominal quotations remain unchanged. The underlying reasons for the scarcity of money and high interest rates are of such a nature that sudden relief is not to be expected. The quickening of transportation and a further liquidation of commodity loans must precede a general easing of rates.

The technical position of the Federal Reserve Banks, as indicated by the statement of condition on Friday, showed considerable improvement. Bills discounted secured by the Government war paper declined \$41,092,000, as compared with the aggregate a week earlier, and total bills were lower by \$87,565,000. Altogether these and other earning assets declined \$75,327,000. Besides, net deposits were lower by \$20,928,000 and Federal Reserve note circulation by \$45,055,000; while cash holdings were advanced \$10,854,000. The net result was a gain of 1.2 points in the ratio of gold reserves to Federal Reserve note circulation after setting aside 35 per cent against net deposits, leaving the ratio 48.7 per cent.

LEROI INCREASES CAPITAL

MILWAUKEE, July 19—The LeRoi Co., organized several years ago to take over the gas engine business conducted for many years by the Milwaukee Machine Tool Co., has increased its capital stock from \$350,000 to \$700,000 to accommodate the growth of the business and provide for future enlargement of output. It manufactures passenger and commercial car and tractor motors under the trade name "LeRoi." The works and offices are located in West Allis, suburb of Milwaukee. C. W. Pendock is president and general manager.

Men of the Industry

P. L. Emerson, who resigned recently as sales manager of Olds Motor Works, Lansing, has been made director of sales of Jackson Motors, Inc., in which he has acquired a financial interest. His training extending over a long period has included manufacturing as well as selling on a large scale. After ten years of selling experience with the John Deere Plow Co., he became general sales manager for the company and for five years acted as secretary and general manager of the Reliance Machine Co. He succeeds W. W. Sterling who continues, however, as vice-president.

Harry A. Rassley has severed his connection as sales manager with C. E. Johansson, Inc., Poughkeepsie, to become export sales manager for the Nordyke & Marmon Co. Before joining the Johansson organization, he represented the General Motors Corp. in the export field for a number of years. His successor is Lawrence G. Spealman, who has been the Johansson representative in Michigan. The Michigan territory is to be taken over by J. K. Murray, at present a member of the sales organization in Poughkeepsie, who will have his headquarters in Detroit.

Joe Tallmadge, assistant sales manager in the east central division of the Willys-Overland Co., has resigned to become sales manager for the Handley-Knight Co., Kalamazoo. After long service with the Franklin Co., with which he became associated in 1909, he was made treasurer of the Atlantic Boat Co., manufacturers and designers of motor boats and marine engines, and since 1915 has been connected with the Willys-Overland Co., first as assistant to H. B. Harper, then sales manager, and later as assistant division manager.

F. R. Speed, former engineer and production manager in the East for the Crane Engineering Co., has been elected vice-president of the Federal Corp., Westfield, Mass., and will be in charge of manufacturing and production. **Fred E. Wells**, identified with financial and merchandising interests, has succeeded C. W. Dodson as treasurer. The company, which has been making Liberty spark plugs exclusively, has organized a department for the manufacture of Croxford rim tools and another for the marketing of an electric socket plug.

Thomas P. Orchard has resigned as secretary and sales manager of the Service Engineering Co., Inc., to accept an appointment as director of sales with the Arthur Knapp Engineering Corp., of New York and Detroit. The corporation is engaged in the design and manufacture of machinery tools and equipment for quantity production and interchangeable manufacture.

Millard S. Binney succeeds J. Albert McCollum, who has become assistant general sales manager, as advertising manager of the Traffic Motor Truck Corp., of St. Louis. R. Jackson Jones, who has been assistant to Harry H. Hawke, general sales manager of the corporation, has been appointed European representative with headquarters in London.

George R. Cullen, who has been associated with the Brearly-Hamilton Advertising agency in Grand Rapids for the last two years, has resigned and opened his own general advertising office in that city. Cullen formerly was with the advertising department of the Studebaker Corp., Hudson Motor Car Co. and Chalmers Motor Car Co.

Frank P. Hanson has been named assistant to J. B. Davidson, secretary of the American Society of Agricultural Engineers, with head-

quarters for the remainder of the year at Ames, Iowa. Hanson is a graduate in agricultural engineering of Iowa State College.

J. D. Siddeley, managing director of the Armstrong-Siddeley Motors, Ltd., Coventry, England, will visit America during September. He will include in his itinerary Detroit, Cleveland, Toledo, Indianapolis, Philadelphia and Canadian points.

William D. Ennis has resigned as professor of marine and mechanical engineering in the Post Graduate Department of the United States Naval Academy to become vice-president of the Technical Advisory Corporation of New York, with which he has been associated since its organization.

J. E. McGinnes, formerly branch manager for the Firestone Tire & Rubber Co. in Milwaukee and connected with the General Tire & Rubber Co., of Akron, as manager of tire sales, has been placed in charge of sales promotion work for the India Tire & Rubber Co.

S. D. Highleyman, for twenty years associated with the farm machinery industry, has been appointed manager of the Indianapolis branch of the Emerson-Brantingham Implement Co., with a territory covering Indiana and parts of Michigan and Kentucky.

Major T. T. Williams has been made executive manager of the Economy Baler Co., Ann Arbor, Mich. He was formerly with the Packard Motor Car Co. as an efficiency engineer, and during the war was in charge of the aerial photographic unit.

H. H. Rice, sales manager of the motor car department of the Nordyke & Marmon Co., is sailing on an extensive trip and will visit England, France, Switzerland, Spain, Portugal, Italy, Greece, Belgium, Holland, Denmark, Norway and Sweden.

C. B. Durham, works manager of Buick Motor Co., is to be assistant to the general manager in Chicago. Durham has been with the Buick organization since 1909, as assistant superintendent and was made works manager a year ago.

J. D. Mooney has been appointed assistant to O. F. Conklin, general manager of the Remy Electric plant at Anderson, Ind. He recently returned from England after assisting in organizing the Remy-Delco, Ltd.

Bernard DeWeese, formerly with Kilbourne & Jenkins, dump body manufacturers, Columbus, now is associated with the Columbus Axle Co., Cleveland, as sales engineer. DeWeese is widely known in the industry.

T. W. Morgan has resigned as president and general manager of the Lorain Motor Truck Co., Lorain, Ohio, which was organized last November, and will be succeeded by M. J. Henninger, vice-president.

Fred H. White is now assistant to the president of the Toledo Steel Products Co., of Toledo. For five years he was connected with the purchasing and service departments of the Willys-Overland Co.

W. H. Radford, chief engineer in charge of all engineering and inspection for the Saxon Motor Corp., has resigned. He has announced no plans for the future.

H. J. Douglas has resigned as controller of Standard Parts Co., Cleveland, and has been made treasurer of the Ewing Bolt & Screw Co., Detroit.

Chauncey H. Murphy has been elected a director of the Locomobile Co., Mercer Motors Co. and Hares Motors.

WILLS OFFICERS CHOSEN

DETROIT, July 19—The following officers have been elected by C. H. Wills & Co.: President, C. Harold Wills; first vice-president, John R. Lee; second vice-president, Kirk V. Alexander; third vice-president, Charles Morgan; secretary, Ferris D. Stone; treasurer, Frank P. Brooke. The officers and Robert S. Potter, vice-president of the National Shawmut bank, make up the board of directors.

ENGINEER TO ADVISE ON TESTS

LONDON, June 18 (*Special Correspondence*)—The Society of Motor Manufacturers and Traders (a body nominally with the same functions as the American Automobile Chamber of Commerce) has arranged with a consulting engineer to advise and assist members wanting tests carried out under the supervision of the society. The engineer will advise as to the most suitable venue for any proposed test and settle the general lines of the test. For this preliminary work there will be no fee, but if the member then desires to proceed with the tests the engineer's charge for supervising it will be payable by the member in addition to the laboratory fees. It is a condition of these tests that if a report is published, it must be published in full.

W. D. BRUNDAGE PROMOTED

JACKSON, MICH., July 16—William D. Brundage, manager of the Albion hub division of the Hayes Wheel Company, has been made assistant manager of all Hayes Wheel plants with headquarters in Jackson. Mr. Brundage announces that beginning Aug. 1 production at the local plant will be increased 20 per cent. The departure of Mr. Brundage from Albion was made the occasion for a testimonial from employees, who presented the departing executive a handsomely bound book containing the original signatures of all the employees as an expression of their appreciation of his efforts in their behalf. Fred S. Brown succeeds Mr. Brundage at the Albion plant.

COWDRY HEADS L. M. AXLE

CLEVELAND, July 20—W. H. Cowdry, president of the American Fork & Hoe Co., and G. B. Durell, treasurer of the same concern, have become heavy stockholders in the L. M. Axle Co., of which Durell now becomes president, treasurer and general manager and Cowdry, chairman of the board of directors. Leo Melanowski, automotive engineer, is the inventor of the axle.

TO MERGE FLYING CLUBS

NEW YORK, July 19—Negotiations for the consolidation of the Aero Club of America and the American Flying Club have been completed successfully. Details of the merger are being worked out by a joint committee and will be announced soon. It is rumored that some of the persons who have been most active in the Aero Club will take a less prominent part in the affairs of the new club.

Calendar

SHOWS

- Aug. 23-27—San Francisco, National Traffic Officers' Safety First Exposition, Auditorium, C. De Witt De Mar, Manager.
- Aug. 25-Sept. 3—Des Moines, Annual Fall Automobile Show in connection with Iowa State Fair, C. G. Van Vliet, Mgr.
- Aug. 28-Sept. 11—Toronto, Canada, National Automobile Show, Automotive Industries of Canada, in connection with Canadian National Exhibition, Exhibition City.
- Aug. 30-Sept. 4—Milwaukee, Annual Automobile Show in conjunction with Wisconsin State Fair.
- Sept. 6-11—Indianapolis, Twentieth Annual Fall Automobile Show in connection with Indiana State Fair.
- Sept. 18-25—Cincinnati, Annual Automobile Show, Passenger cars only.
- Sept. 20-26—Los Angeles, National Tractor and Implement Show of the West, Tractor and Implement Dealers' Ass'n of Southern California, Guy H. Hall, Mgr.
- Sept. 27-Oct. 2—Buffalo, Closed Car Show, Buffalo Automotive Dealers' Ass'n, Elwood Music Hall, C. C. Proctor, Mgr.
- Oct. 6-16—New York, Electrical Show, Grand Central Palace, George F. Parker, Manager.
- Nov. 14-21—New York, Automobile Salon, Commodore Hotel Ballroom.
- Nov. 15-20—Chicago, Automotive Equipment Show, Coliseum, Automotive Equipment Association.
- Dec. 10-18—New York, Motor Boat Show, Grand Central Palace.
- Jan. 8-15—New York, National Passenger Car Show, Grand Central Palace, Auspices of N.A.C.C.
- Jan. 29-Feb. 4—Chicago, National Passenger Car Show, Coliseum, Auspices of N.A.C.C.
- Feb. 6-12—Columbus, National Tractor Show, Columbus Tractor & Implement Club, Ohio State Fair Grounds.

FOREIGN SHOWS

- Aug. 7-Sept. 15—Motorcycles, sidecars etc. Antwerp

- Sept. 4-25—London, Machine Tool and Engineering Exhibition, Machine Tool Trade Ass'n, Inc., Olympia.
- October—London, Commercial Vehicle Show, Olympia.
- Nov. 4-13—London, International Motor Exhibition, Society Motor Mfr's and Traders, Ltd., Olympia and White City.
- Nov. 29-Dec. 4—London, Cycle and Motorcycle Show, Cycle and Motorcycle Mfr's and Traders Union, Ltd., Olympia.
- Jan. 7—Sydney, Australian Motor Show.

CONTESTS

- July 24—Watertown, N. Y. Dirt track.
- July 31—Fulton, N. Y. Dirt track.
- Aug. 7—Erie, Pa. Dirt track.
- Aug. 14—Buffalo, N. Y. Dirt track.
- Aug. 14—Elgin, Ill. Road race, Chicago Automobile Club.
- Aug. 20-21—Middletown, N. Y. Dirt track.

- Aug. 21—Johnstown City, Pa. Dirt track.
- Aug. 28—Canandaigua, N. Y. Dirt track.
- Aug. 27-8—Flemington, N. J. Dirt track.
- Sept. 5—Targa Florio Race, Sicily.
- Sept. 6—Hornell, N. Y. Dirt track.
- Sept. 6—Cincinnati, O. Speedway.
- Sept. 6—Uniontown, Pa. Speedway.
- Sept. 17-18—Syracuse, N. Y. Dirt track.
- Sept. 25—Allentown, Pa. Dirt track.
- Oct. 1-2—Trenton, N. J. Dirt track.
- Oct. 8-9—Danbury, Conn. Dirt track.

CONVENTIONS

- Aug. 10—Niagara Falls, Ont. Automotive Metal Wheel Ass'n. Clifton House. Standardization Discussions.
- Sept. 16-17—Cleveland. Motor and Accessory Manufacturers' Ass'n. Credit Convention.

Sterling and Empire Form Sales Company

NEW YORK, July 19—The Rubber Corp. of America has been organized by the Sterling Tire Corp. and the Empire Rubber & Tire Co. in co-operation with New York banking interests and has taken over the entire sales and selling organization of the two manufacturing companies. The manufacturing companies in all other respects remain separate and distinct, as before, with no change in the controlling interests of either of them.

The new sales company has been formed for the object of increasing efficiency, securing economy in branch operations, maintaining larger stocks of goods in centrally located storehouses, consolidating advertising effort and relieving the heads of the manufacturing departments of all details of selling and financing sales.

It is also announced that F. A. Goddard has succeeded Ellis R. Northrup as second vice-president of the Sterling corporation, with which Goddard has been connected in various capacities, including that of manager of the New York and Brooklyn branches, for about eight years.

Show Cars and Trucks at Iowa State Fair

DES MOINES, July 19—Des Moines automotive dealers are making preparations for the annual early fall show which is held each year in connection with the Iowa State fair. The fair will be held this year Aug. 25 to Sept. 3 and a majority of the dealers will have displays. The show will be held in Machinery Hall at the fair grounds which

has available for display space approximately 20,000 feet of floor space.

The show is sponsored by the state fair management with the full co-operation of the Des Moines Automobile Dealers' Association and the Des Moines Truck Dealers' Association. Both cars and trucks will be shown in Machinery Hall and those motor car dealers who hold tractor contracts will also show them. However, the majority of the tractors will be shown in the open air. C. G. Van Vliet, one of the managers of the winter show, is in charge of the state fair show.

Winchester Stores to Sell Equipment

NEW HAVEN, CONN., July 19—The Winchester Repeating Arms Co. announced to-day that it does not intend at present to go into the manufacture of automobile accessories, although accessory departments will be conducted in all the Winchester stores throughout the country. The stocks which will be carried will be purchased in the open market and sold at the regular prices.

The Winchester company will have exclusive stores of its own in all cities of 50,000 population or more which will serve as distributing centers and warehouses will be operated in connection with them. In the smaller places some hardware dealer already established will be appointed the Winchester dealer and his store will be recognized as the Winchester store. He will carry a complete stock of the Winchester products and also will have an automobile accessory department. An elaborate merchandising system has been worked out and each dealer will have all the assistance the company can give.

N. A. D. A. Committee Discusses Road Plans

BUFFALO, July 21—Present and future problems of highway construction and maintenance were discussed here at a conference of the highway committee of the National Automobile Chamber of Commerce at the Lafayette hotel.

Roy D. Chapin of Detroit, president of the Hudson Motor Car Co., presided. Other members present were William E. Metzger, vice-president of the Columbia Motors Co.; George M. Graham, sales manager of the Pierce-Arrow Motor Car Co.; E. S. Jordan, president of the Jordan Motor Car Co., and Pyke Johnson of Washington, secretary.

Conferring with the committee members were George C. Diehl, Erie county engineer, who is chairman of the good roads committee of the American Automobile Association; T. H. MacDonald of Washington, chief of the United States Bureau of Public Roads, and A. T. Goldbeck, Washington, engineer of tests for the public roads bureau.

The conference was of general nature.

RED DIAMOND MOTORS TO BUILD

NEW YORK, July 19—Plans have been drawn up by the H. D. Best Co. for the construction of a plant at Atlanta, Ga., to house the Red Diamond Motors, recently organized with \$5,000,000 capital. Construction will be of steel and concrete, with the first unit to cost \$250,000. Three additional units with machine shop and foundry will be built. The first of the machinery equipment has been ordered and it is expected that the manufacture of automobiles will be started this year. The officers of Red Diamond Motors are W. H. Seabrooker, P. E. Hicks and Henry Short.